TECHNOLOGY DEPT.

Grinding and Finishing

Select Better Coated Abrasives

page 28

Also in this issue:

Automatic Grinder Control to Millionths
Control Reduces Tool Grinding Costs
's Diamond Wheels for Germanium
umbling Fragile Parts in Standard Equipment
ingle Diamond Dresses Double Grinding Wheel

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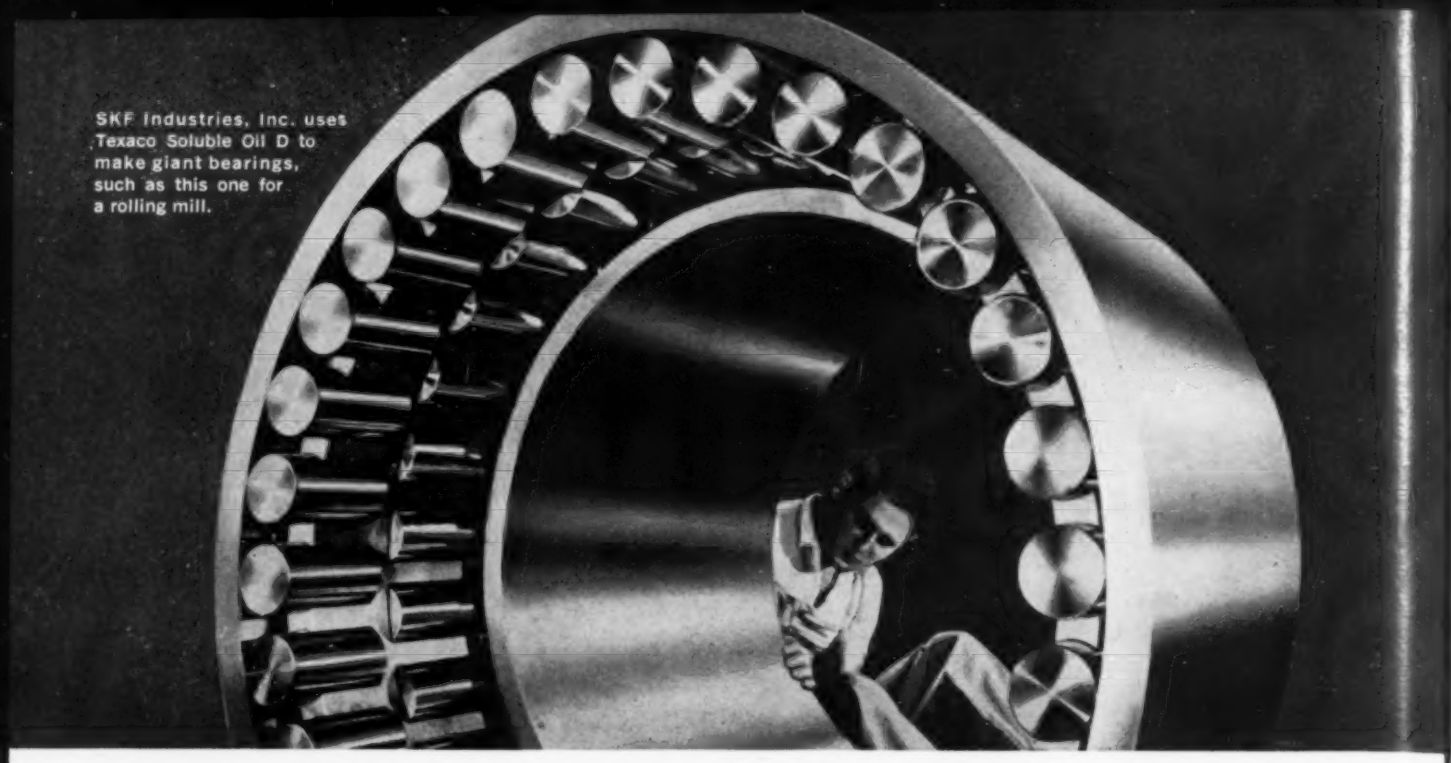
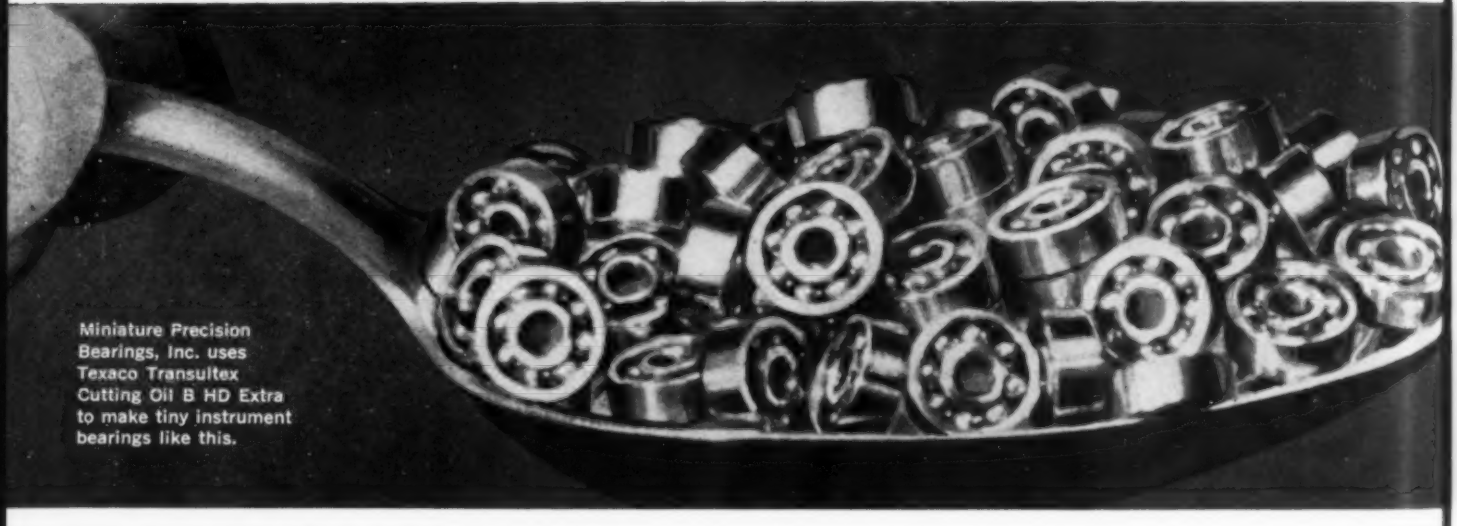


SKF Industries, Inc. uses Texaco Soluble Oil D to make giant bearings, such as this one for a rolling mill.

WHAT SIZE IS YOUR MACHINING PROBLEM?



Miniature Precision Bearings, Inc. uses Texaco Transultex Cutting Oil B HD Extra to make tiny instrument bearings like this.

If you make anti-friction bearings of any size, you need grinding fluids that prevent rust and produce uniformly fine finishes. These fluids must also take into account the bearing material and the operating condition of your machines. They must have specific stability, cooling properties and ability to settle grinding dirt quickly. Otherwise your production drops and the number of rejects rises.

The makers of the small and large bearings shown above get fine bearing finishes and high production by using Texaco. There is a complete line of Texaco Cutting, Grinding and Soluble Oils to help improve machining on every job.

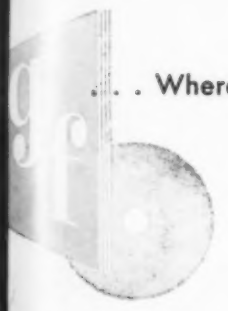
Take this tip. Use Texaco Cutting, Grinding and Soluble Oils—they'll help you produce faster, better and at lower cost, whether your product is the largest or the smallest.

Let a Texaco Lubrication Engineer suggest the best ones for your jobs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

. . . Wherever abrasive operations are performed



grinding and finishing

Contents • September, 1958

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BPA

FEATURE ARTICLES

Control Reduces Tool Grinding Costs 24
A tool grinding program at International Harvester greatly reduces their grinding costs with very little additional effort. By Jules Caldwell

Select Better Coated Abrasives 28
Basic information on grits, grain, adhesives and backing for coated abrasives. By Clayton J. Holland

Tumbling Fragile Parts in Standard Equipment 32
Standard equipment may be used with various types of tumbling media for deburring of fragile parts. By Charles Kramer

Single Diamond Dresses Double Wheel 38
Wheels used to grind airfoil lugs for jet engines are dressed by single diamond.

New Inhibitor Extends Emulsion Life 41
Substantial savings result from extended life of emulsion type coolant.

Automatic Grinder Control to Millionths 42
Exact measurement of bed movement by new grinder control gives higher production and increased quality.

Diamond Wheels Cut Germanium, Silicon 45
Very thin metal bonded diamond wheels are used to cut wafers and guard against edge breakage. By Albert H. Carr

Hopper Feed Speeds Small Parts Grinding 50

SHOP HINTS 53

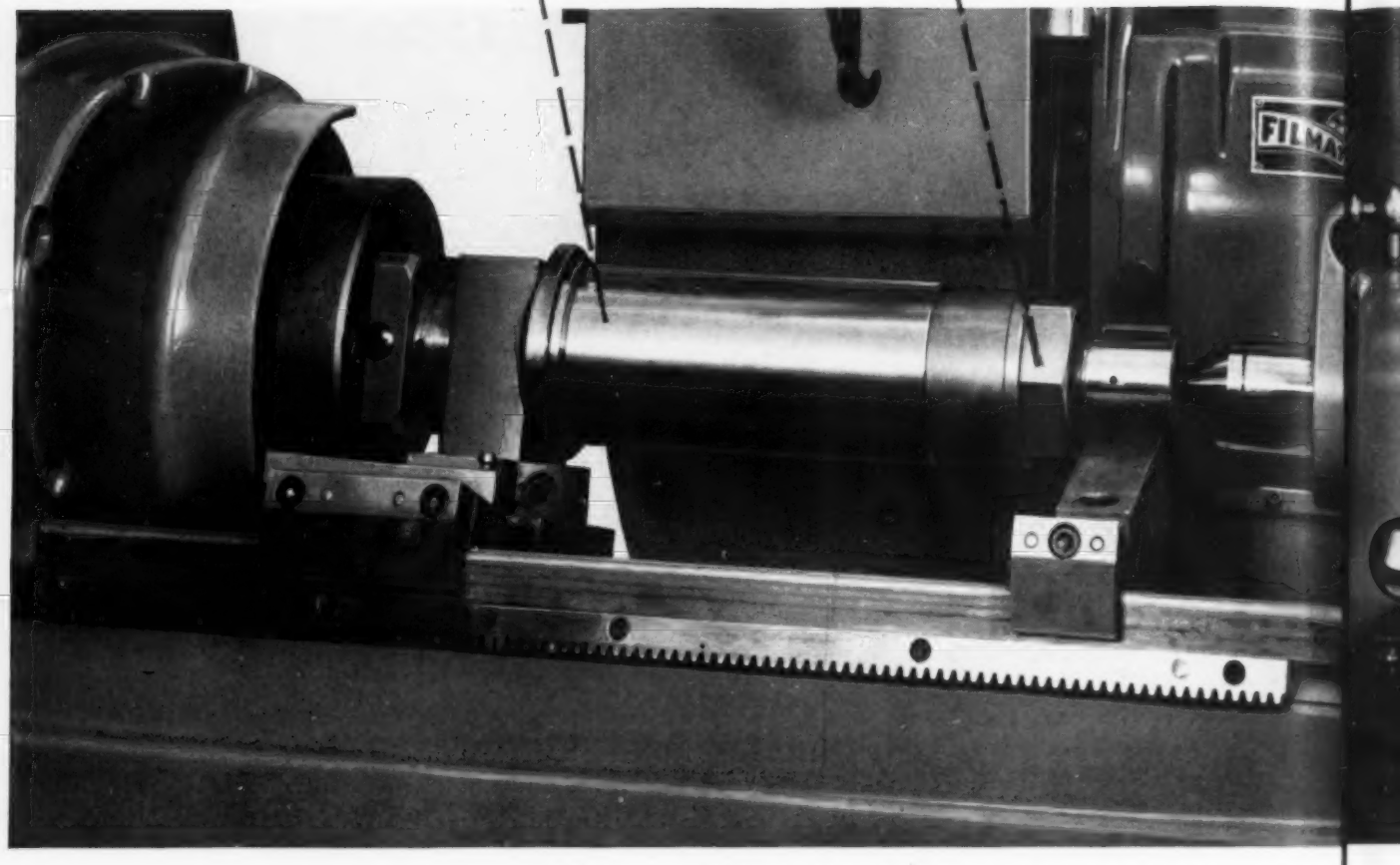
Cover photo: The guard shown on the machine on the cover has been moved from the operating position only to give a better view of the operation

DEPARTMENTS

Letters 10
Grinding and Finishing Around the Country 12
News of Metalworking 16
Editor's Page 23
Grinding Safely 57
Questions and Answers 59
Free Literature 61
New Equipment and Materials 69
News of Industry 89

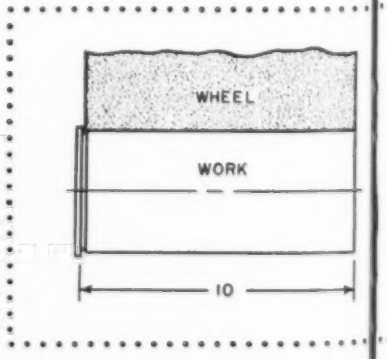
Advertisers Index and District Managers listed on Return Card Insert

The *LONGER they are



CINCINNATI FILMATIC 10"R Plain Hydraulic Grinding Machine. Catalog No. G-661-1.

Wide wheel infeed grinding saves time. 7½" to 10" length of thin walled cylinder sleeves are ground in one cycle on CINCINNATI FILMATIC 10"R Plain Hydraulic Grinder equipped with 20 hp heavy duty wheel-head, and 10⅛" wide solid wheel.



CINCINNATI®

CENTERTYPE GRINDING MACHINES • CENTERLESS GRI CHINES
ROLL GRINDING MACHINES • SURFACE GRINDING MACHI CKING

ethe more you can save

...by Infeed Grinding on Cincinnati Filmatic 10"R Plain with Heavy Duty Equipment

Wide wheel infeed grinding usually saves time compared to traverse grinding, but more machine "muscle" is required. CINCINNATI FILMATIC 10"R Plain has the basically rugged framework to exert this extra muscle, and with a 20 hp heavy duty wheelhead and 1½ hp headstock drive, work up to 10" long can be automatically ground in one infeed cycle just as smoothly and at a lower cost than narrow wheel traverse grinding.

Here's the way CINCINNATI FILMATIC 10" Plain Grinders can be equipped to infeed grind long work:

Solid wheels, 24" dia. x 10⅛" wide or 30" dia. x 9" wide

Spaced wheels, 30" dia. x 15" wide, up to 9" total width of wheels

The machine illustrated, a heavy duty type with 10⅛" wide wheel, grinds 7½" to 10" length of cylinder sleeves in one automatic infeed cycle. Other cost-reducing equipment includes: air-electric gage sizing... automatic behind-the-wheel profile truing, with counting device... repetitive angular position stopping of headstock spindle... automatic grinding wheel reciprocation. Of course, the grinding wheel spindle bearings are standard FILMATIC; they easily withstand any load the motor is capable of pulling. ¶ It's to your advantage to consider CINCINNATI first for your standard or special centertype grinding machine requirements. Complete information on the conventional 10"R machine may be obtained by writing for catalog No. G-661-1. Look in Sweet's Machine Tool File for brief specs.

Drawing of part.

Part name	Sleeve
Material	Cast iron
Stock allowance	.010" max.
Estimated production	38 per hour at 80% efficiency

CINCINNATI

CHINES • MICRO-CENTRIC GRINDING MACHINES
CKING GRINDERS • CENTERLESS LAPPING MACHINES

Grinding Machine Division
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

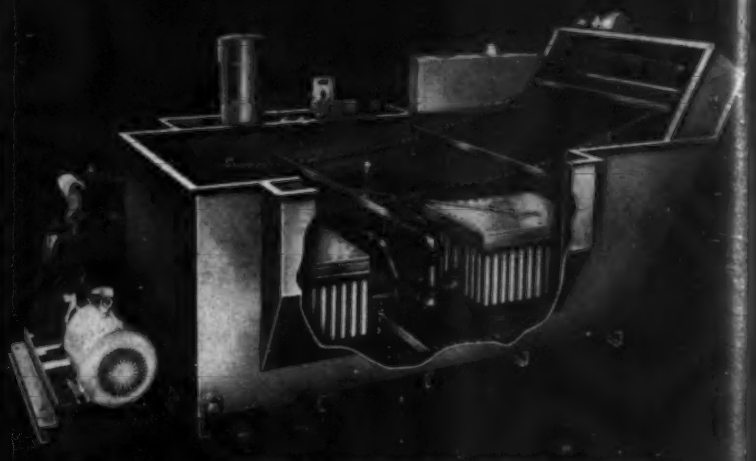
to serve your filtration needs better....

COMMERCIAL FILTERS CORPORATION ACQUIRES

Delpark

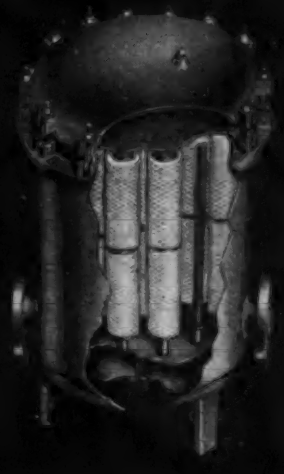
Now, from one source, you can meet your complete needs for fine filtration through three broad lines — Delpark Filters, Fulflo Filters, and CFC Filters which include Honan-Crane and Michiana models.

To provide more comprehensive service, Commercial Filters Corporation has acquired the Industrial Filtration Company, manufacturers of Delpark Filters. The company will operate as the Delpark Division of Indiana Commercial Filters Corporation, Lebanon, Indiana.



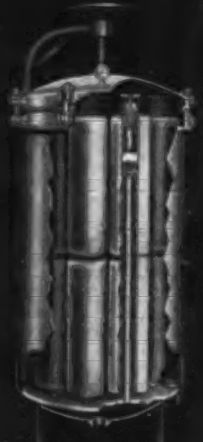
Delpark FILTERS

Delpark offers a large selection of filters for coolants, cutting oils, quenching oils, rolling oils, and lubricants — for both heavy and light dirt loads. Products also include a filter for paint spray booth water. Filter media consist of natural or synthetic fibres and metal screens in tubular or leaf form.



Fulflo FILTERS

Fulflo Filters, with genuine Honeycomb Filter Tubes in a variety of natural and synthetic fibres, offer true depth filtration to any degree of continuous micro-clarity. Applications include all kinds of oils, fuel, water, chemical solutions, compressed air, CO_2 and other gases. For high or low flow rate, pressure, viscosity.



CFC FILTERS

CFC Filters, including Honan-Crane and Michiana models, provide selective filtration of all types of oils — lubricating, coolants, quenching, hydraulic, diesel, etc. Bulk and cartridge type elements. Products also include impregnating oil dehydration units, magnetic separators, automatic tubular conveyors, coolant clarifiers, and settling tanks.

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS

with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.

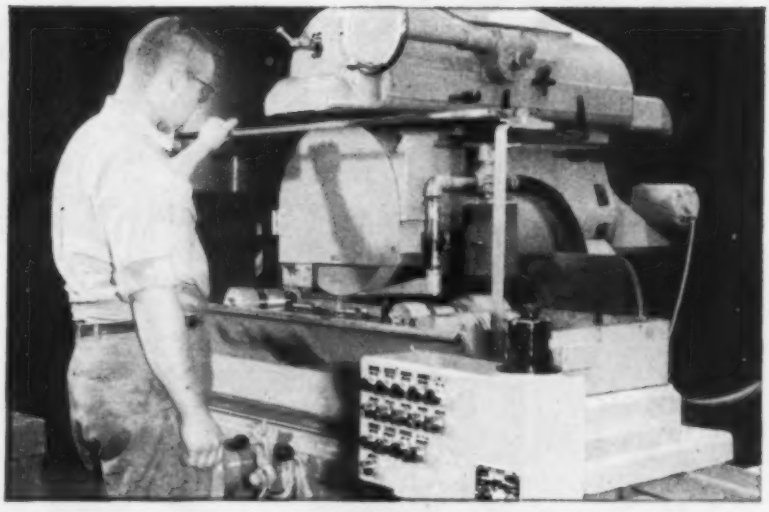
CFC FILTERS

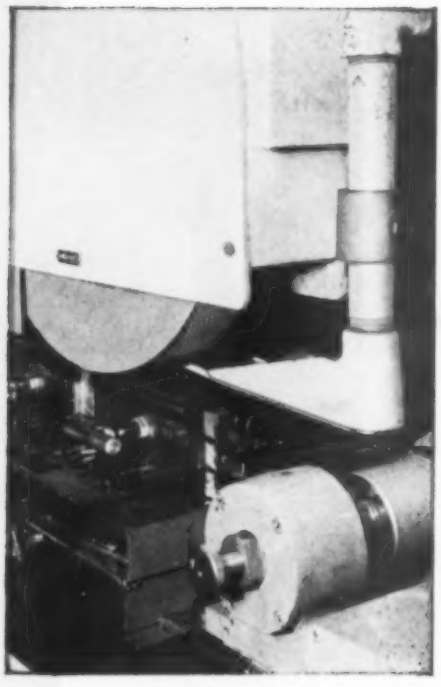
Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.

Thompson — TRUFORMING CUTS COSTS 66%

. . . DOUBLES PRODUCTION AND IMPROVES PRODUCT

AT THE OLIVER CORPORATION





In the production of ledger plates, used in the cutter bar of mowing machines, The Oliver Corp. of Chicago, formerly first milled the teeth, then hardened the plate. The hardening process caused distortion and variance in uniformity which impaired the cutting action of the bar.

On the advice of Thompson engineers, a Type BB Truforming Grinder with a 2½" width grinding wheel was installed to process these ledger plates as a finished grinding operation. The plates are now heat treated first and the teeth are then formed by grinding.

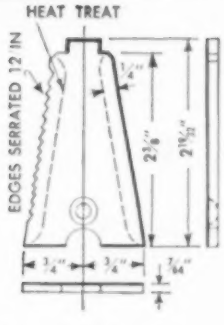
The installation of the Thompson Truforming Grinder has accomplished the following results:

1. **Cut total production costs from $3.18 to $1.06 per 100 pieces.**
2. **Increased the production rate from 1600 to over 3600 pieces per 8-hour shift.**
3. **Provided constant uniformity in the workpieces.**
4. **Eliminated the full-time service of one man.***
5. **A pair of $160.00 milling cutters formerly produced 20,000 pieces. A $60.00 grinding wheel now produces well over 40,000 pieces.**

The leadership of Thompson Truforming Grinders results from 25 years of research and development work in crush form grinding. Today these machines are opening up hundreds of practical, time-saving, profit-improving and cost-cutting applications for industry.

Thompson's engineering experience is available to you without obligation. Write for Catalog T558.

**Automatic machine cycle allows operator time to countersink hole in plate—an operation formerly requiring one man's full time.*



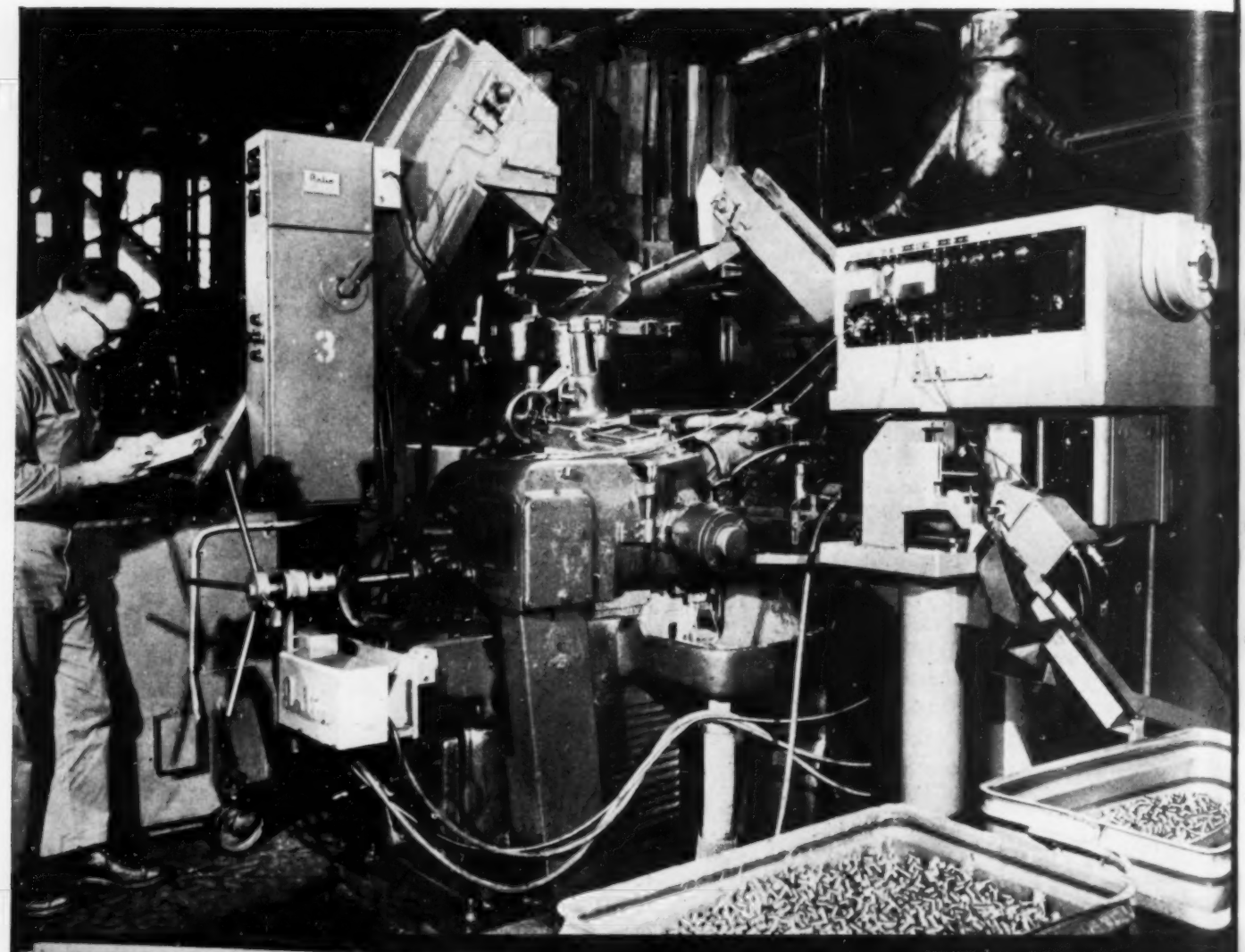
LEDGER PLATE
High Carbon Manganese Steel
Rockwell C52-58

"Keep Thompson in mind for that daily grind"

THE THOMPSON GRINDER CO.
SPRINGFIELD, OHIO

Thompson SURFACE GRINDERS

NOW...A PROVEN C



Control Panel Indicator Lets You Watch Size and Taper.

Push-Button Control for automatic or manual operation.

Signal Lights Flash
—as correction is called for.
—when parts are out of size and being rejected.
—when parts are in size.

Classifier Meter shows finished part size.

Program Meter shows amount of correction being made.

BACKED BY YEARS OF EXPERIENCE IN ELECTRONICS AN

CENTERLESS GRINDER CONTROL

WITH 5 BIG ADVANTAGES!

1 **Uniform Accuracies**—Produces consistently uniform parts. Eliminates intermediate grinding operations.

2 **Automatic, Self-Compensating**—Operates automatically, with 100% repeatability. Grinder bed automatically advances to compensate for wheel wear and to maintain parts at required size. Corrections controllable from .000025 to .0005. The RCA Control in no way limits capacity of grinder.

3 **"Space-Age" Tolerances**—Even the most critical tolerances demanded for precision equipment can be held by the RCA Grinder Control—tolerances as close as 50 millionths.

4 **Practical for Short or Long Runs**—Complete set-up time for the Control takes less than three minutes. After installation of Control, the grinder can be operated automatically or manually by merely pushing button on panel.

5 **Saves Money, Eliminates Scrap**—Production rate increases of 300% have been achieved. Scrap is eliminated; out-of-size parts are held to barest minimums; unit costs are lowered; users report greatly extended wheel life.

PLUS THESE FEATURES:

- Easy installation—requires no modification of grinder.
- One operator can oversee a group of control-equipped machines.
- Control can be moved from one machine to another.
- Minimum maintenance . . . components sealed against chips, dust and moisture.

RCA also manufactures a line of electronically controlled systems for integrating and automating assembly lines, elevating hoppers, parts feeders and orienters, automatic high-speed hardness testers, assembly machines and inspection devices.

30-DAY TRIAL INSTALLATION

As evidence of our confidence in the RCA Grinder Control, we will—on the recommendation of our field engineers—install a control system in your plant on a *trial basis for 30 days!* Call in one of our men soon to evaluate your grinding operations and make recommendations. This offer expires December 31, 1958, so mail the coupon today for quick action.

RCA Tmk(s) ®

RADIO CORPORATION of AMERICA

DETROIT, MICHIGAN

AUTOMATIC CONTROL....

Radio Corporation of America
Dept. K-339, 20309 Schoolcraft Road
Detroit 23, Michigan

Please send me:

- ☐ Illustrated brochure on Electronic Grinder Control.
- ☐ Complete information on other parts handling, testing or inspection equipment.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

☐ Have representative call

Now—FINISH FLAT

New Norton 6" x 18" Surface Grinder Ready For Immediate Delivery

You FINISH FLAT FASTER with the new Type S-3 hydraulic which is equally efficient for long production runs or a wide variety of toolroom grinding because of its new cost-cutting features. It produces plane surfaces smoothly — with automatic or manual cross feed and with such fast, cool-running action that it saves time and money on every job.

Ask your Norton Representative for the whole story. Or write us direct for Catalog 2128. And remember: only Norton Company offers you such long experience in both grinding machines and grinding wheels to bring the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

Profit from these benefits

1. Get Jobs Done Fast and Cool — high table speed, *125 feet per minute, maximum.* **2. Handle Tall Work Pieces** — greater vertical capacity, *15"*. **3. Get Lasting Accuracy** with guide-rail cross slide construction. **4. Control Vertical Feed Accurately and Position Fast** with two-speed .0001" increment hand wheel. **5. Benefit from Better Sighting and Loading** due to contoured splash guards. **6. True Forms, Even on Worn Wheels** because of recessed wheel spindle housing.

To Economize, Modernize with **NEW**

NORTON

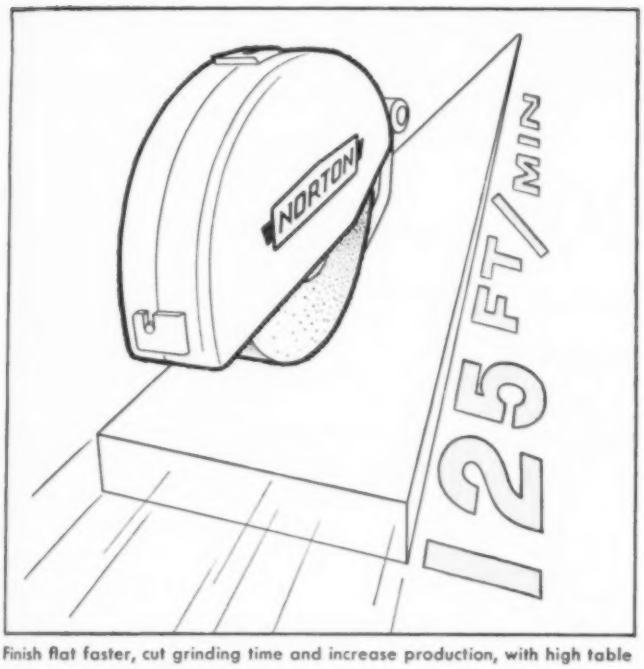
GRINDERS and LAPPERS

Making better products... to make your products better

NORTON PRODUCTS
Abrasives • Grinding Wheels • Grinding Machines
Refractories • Electrochemicals
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes
District Offices
Worcester • Hartford • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

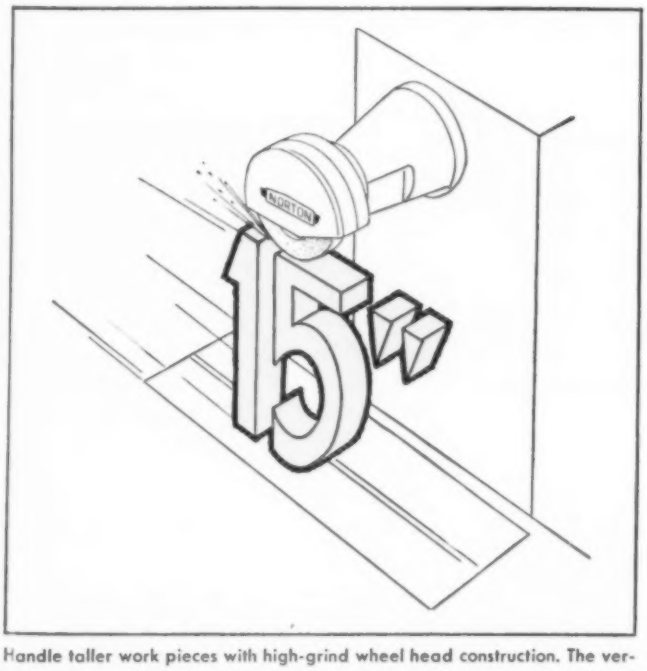
FASTER.... at lower cost

These and many other new features make this machine a "must" for your surface grinding jobs.



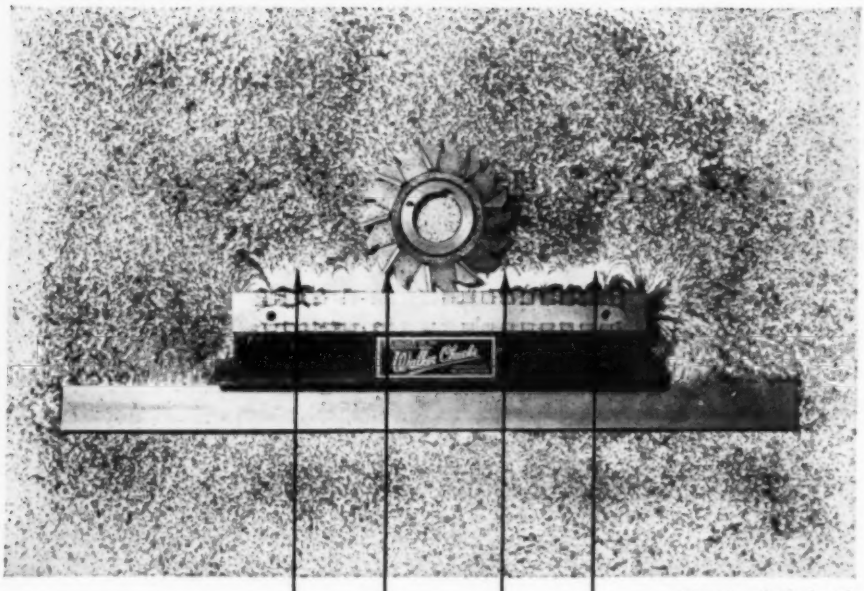
Finish flat faster, cut grinding time and increase production, with high table speed, 125 feet per minute.

Heat goes off in the chips, due to new, high table speed. This cooler grinding permits faster production on heat-sensitive metals.



Handle taller work pieces with high-grind wheel head construction. The vertical capacity from the table top to the bottom of standard full size 8" diameter grinding wheel is 15"

Widely spaced, flat ways and guide-rail cross slide design maintain cross feed accuracy, providing lastingly accurate grinding of shoulders or parallel surfaces.



(Unretouched photo)

Here's POSITIVE PROOF

...that WALKER Ceramic Magnet Chucks Eliminate Cutter Clogging and Chip Carryback

Now, for the first time, you can perform milling operations on workpieces held by magnetic chucks, with *minimum* clogging of the cutter, *minimum* carryback of chips into the cut, for trouble-free cutting.

The new Walker Ceramic Magnet Chuck, with magnets polarized *horizontally*—an exclusive construction feature—keeps the cutter constantly *demagnetized* as it progresses. As shown by the white area in the above magnetograph, the magnetic force is where it should be—confined to the top of the chuck for maximum holding. There are no lines of magnetic force extending upward to magnetize the cutter.

In addition to this extremely important feature, Walker permanent chucks offer a great many other advantages.

For example:—

- The ceramic magnets used have many times the coercive force of alloy magnets.
- Uniform holding throughout because of ¼" bar poles.
- All steel top plate. *No* soft insulating material is used.
- Less than half the weight of previous permanent chucks.
- All magnetic fields are neutralized to prevent magnetism of machine table or ways.

Walker permanent chucks with ceramic magnets are available in a complete range of sizes, 6x10", 6x12", 6x18", 8x24", 10x15". Write today for Catalog 58.

O. S. WALKER COMPANY, INC.

WORCESTER 6, MASSACHUSETTS, U. S. A.

The Original Designers and Builders of Magnetic Chucks

Letters to the Editor

Cleaning of Coolants

We have your copy of Part II Cleaning of Grinding and Finishing Coolants, of which we would appreciate one more copy and two copies of Part I. At the same time, we would also appreciate receiving copies of your magazine to the attention of the undersigned.

Max Randall, Pres.
Randall Manufacturing Co., Inc.
New York 59, N.Y.

We are inquiring as to availability of two copies of a recent paper in your trade journal, GRINDING and FINISHING. Please advise if reprints are available for "Recommended Methods of Cleaning Coolant on Grinding and Finishing Machines," parts 1-4. If available from your supply, please send at your convenience, and advise of any cost for handling.

We note with interest, one of our principals—Aget Manufacturing Co.—utilizes GRINDING and FINISHING as an advertising media from which we receive frequent direct and indirect inquiries.

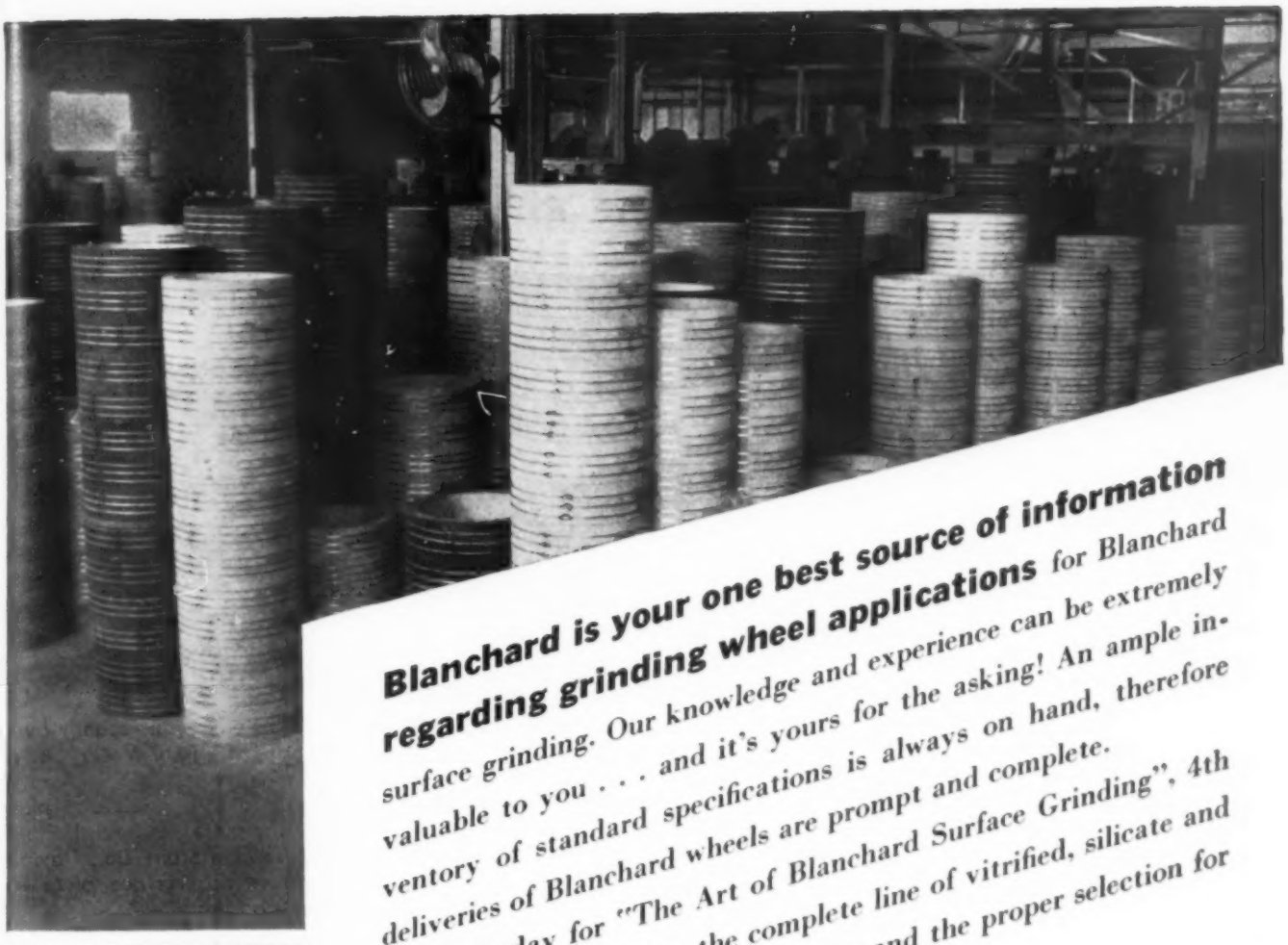
R. H. Walpole, Jr.
John H. Schmidt Co.
Oakland, Calif.

Coated Abrasive Wheel

I want to congratulate you on a very fine article in the June issue of GRINDING and FINISHING concerning a flap-type coated abrasive wheel, and I want to thank you and your fellow editors on behalf of our company for the mention you gave us on page 40 of your magazine regarding our work with Continental in Detroit.

I am very much interested in getting tear sheets on the article on the flap-type coated abrasive wheels, Mr. Patterson, and I wonder if it would be possible for you to send me ten to fifteen tear sheets of that article. We are engaged in a training program here at Roto-Finish for new salesmen, and I feel that your article should have a definite place in this program. If it would be possible for you to send them to me, I would certainly appreciate it.

W. J. Walther, Sales Mgr.
Roto-Finish Co.
Kalamazoo, Mich.

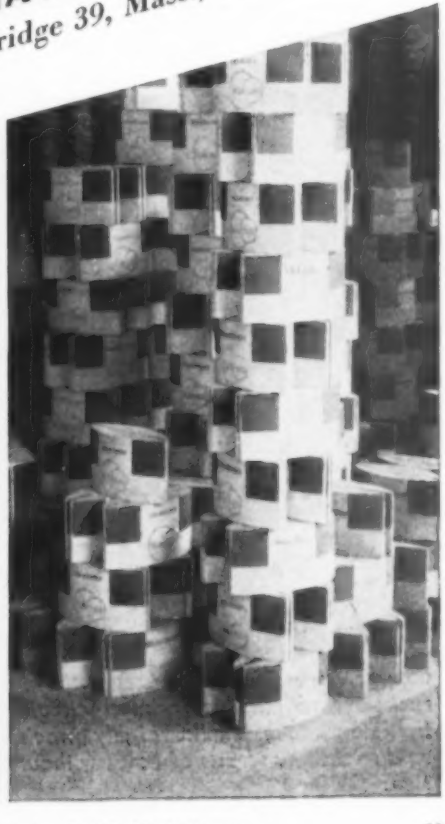


Blanchard is your one best source of information regarding grinding wheel applications for Blanchard surface grinding. Our knowledge and experience can be extremely valuable to you . . . and it's yours for the asking! An ample inventory of standard specifications is always on hand, therefore deliveries of Blanchard wheels are prompt and complete.

Send today for "The Art of Blanchard Surface Grinding", 4th edition, which describes the complete line of vitrified, silicate and resinoid bonded wheels and segments and the proper selection for Blanchard vertical spindle surface grinders.

THE BLANCHARD MACHINE COMPANY

64 State Street Cambridge 39, Mass., U.S.A.



wherever abrasive operations are performed

Grinding and Finishing Around the Country

From Bombs to Bricks in Bombardment

A pilot in a small private plane with a brick may ultimately be the most sensible way to conduct a bombardment, based on inflicting the maximum dollars worth of damage at a minimal cost. Until anti-missile missiles are perfected, the missile is the most effective weapon.

Dr. Martin L. Klein, director of the Research Division of Cohu Electronics, Inc., San Diego, brought this message to more than 100 U.S. Air Force personnel in a July 11 briefing session.

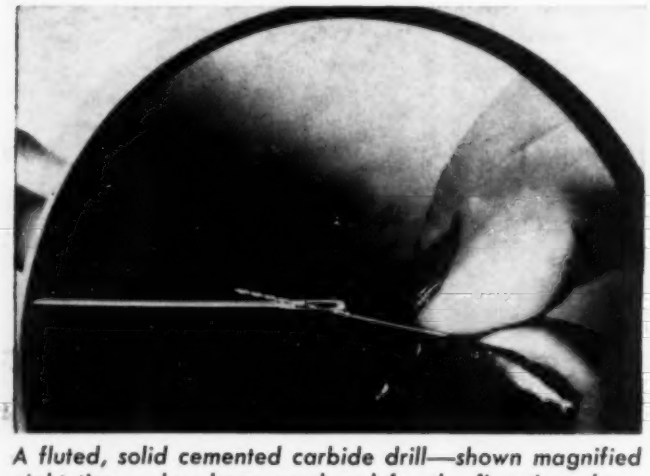
"To evaluate a weapon," Dr. Klein said, "a figure of merit is established based on the number of dollars worth of damage a weapon does in terms of its cost. Thus a $1 million missile that can inflict $20 billion worth of damage has a figure of merit of 2,000. This . . . is the test of any weapon."

At the present time, there is no way to intercept missiles as the high-powered Atlas and Titan. This keeps their figure of merit high. But within two or three years Klein believes that an anti-missile missile will be built which will intercept these missiles. As other offensive weapons are developed, however, new defensives will be built to counter them.

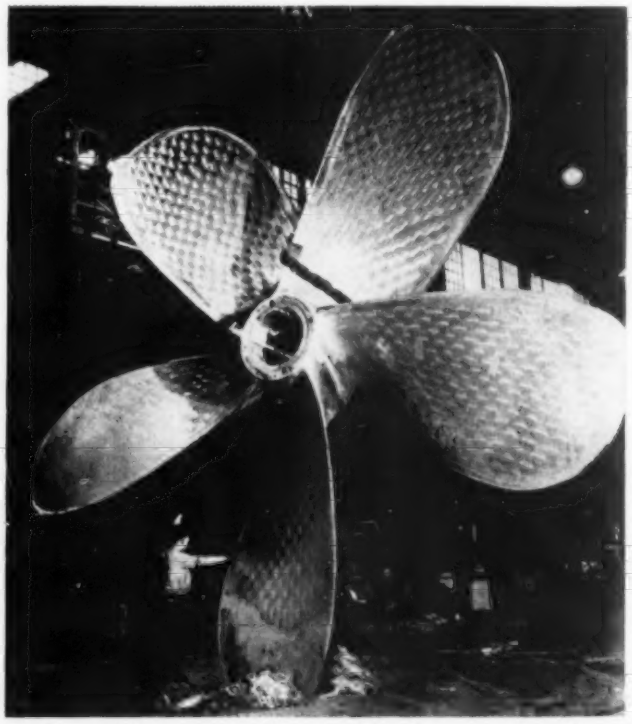
"Thus, we will probably traverse the entire circle and a pilot in a Piper Cub with a brick will ultimately be the most sensible way to conduct a bombardment."

•

This one-piece granite surface plate has just recently been installed at the Oakville Plant of the Ford Motor Co. of Canada. It measures 20' long, 10' wide, 20" thick, and weighs 27½ tons—reputedly the largest surface plate ever produced. The surface of the plate has been finished so it is flat within .002". The Herman Stone Co., Dayton, Ohio, was asked to manufacture this surface plate for accurately checking automobile bodies.



A fluted, solid cemented carbide drill—shown magnified eight times—has been produced for the first time down to 0.024" diameter by Van Norman Industries' Detroit Division, Super Tool Co., Detroit. These tiny precision drills have been produced for making holes in titanium, copper, brass, aluminum, plastics, etc., employed for rockets and missiles, printed circuits in the electronics field, and other similar highly precision work. They are said to drill hundreds of holes without varying of the hole size.



Larger and larger propellers to drive the newest and most modern ships in the world are being manufactured at Eddystone Division, Eddystone, Pa. of Baldwin-Lima-Hamilton Corp. Three new propellers now being produced measure 24'8" and weigh over 38 tons. The wheels will be used on giant super-tankers now under construction in Japan by Welding Shipyard Division of National Bulk Carriers, Inc. The first propeller will be installed on the S.S. Apollo.

Radioactivity Is of Value For Inspection

Tiny amounts of radioactivity are helping engineers to develop better fuel systems for jet aircraft. The research on fuel nozzle failure was described by three engineers from the Batelle Memorial Institute at the ASME meeting. To measure wear of parts (as little as 1/1,000,000 of a gram per hour) quickly and at reasonable cost, the researchers devised a system to make the nozzle parts radioactive, and then circulate a steady stream of hot fuel through them. Later the fuel was measured for radioactivity. •

New Plastic Material Has Properties of Nylon & Steel

A plastic material called Vulkollan, combining desirable properties of rubber, nylon and steel, is said to combine "hardness, strength, rigidity, resilience, load carrying, oil resistance and oxygen or ozone resistance as no other material has ever done before."

According to Kenneth A. Pigott of the Mobay Chemical Co., speaking at the semi-annual meeting of the American Society of Mechanical Engineers, the substance will snap back to its original size after being stretched to five or six times its original length. A good application is for handles for air hammers. •

Use of Aluminum In Auto Engines

In a Society of Automotive Engineers' meeting, Darl F. Caris and Dr. Robert F. Thomson of the General Motors Staff reported on laboratory and road tests with three experimental V-8 aluminum engines. Aluminum for engine blocks is of value because of its low specific gravity and lighter car weight possibilities.

The need of a ferrous liner or coating for bore material in previous aluminum auto engines, can be met by the manufacture of a wear-resistant aluminum alloy. •

Control Data Contracts For Air Traffic Control Device

A keyboard system device, which will transmit flight information to high-speed electronic computers that will be used in the nation's air traffic control modernization program, is being developed by Control Data Corp., Minneapolis. •

"The Tool & Die Makers Surface Grinder"

Harig's NEW TML 6x12 SURFACE GRINDER

THE NEW TML BY HARIG PROVIDES EXTREMELY FAST AND ACCURATE GRINDING—STURDY CONSTRUCTION—ADVANCED DESIGN WITH ECONOMY IN MIND. . . *THE LOW COST WILL PLEASE YOU!*

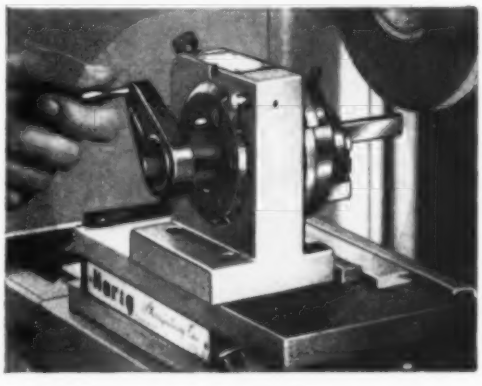
OUTSTANDING FEATURES

- Solid one piece construction of spindle housing and vertical slide.
- Elevating screw centrally mounted.
- Combination "V" and flat ways assure positive alignment.
- Angular rack and pinion mounting distributes wear equally along rack and pinion face.
- Motorized Spindle, dust collector and water unit available.

SPECIFICATIONS

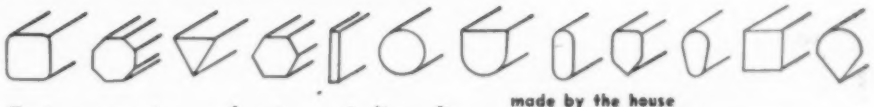
Longitudinal Travel	12-3/8"
Cross Feed Travel	7"
Vertical Working Height (Under 7" dia. wheel)	0" to 12-3/4"
Platen Working Area	6" x 12"
Grinding Wheel	7" x 1/2" x 1-1/4"
Elevator Handwheel Graduation	.0005
Cross Feed Handwheel Graduation	.001

Remember: Harig's Famous Precision is in Evidence Throughout!



Harig's IMPROVED Grind-All FIXTURE

"The Latest Advancement in Perforator Grinding"



Fast, accurate perforator grinding fixture — hand crank for easy rotation of index plate, single locking screw for making quick set-ups. Easily grinds irregular shaped perforators concentric with shank within ±.0002 accuracy. Also can be used as milling, boring and inspection fixture. NEW! RADIUS DRESSER ARM—attachment makes Grind-All Fixture a highly accurate radius dresser.

made by the house that precision built!

Harig Manufacturing Corp

5769 W. Howard St. - Chicago 31, Ill.

SIMONDS ABRASIVE CO.

DIAMOND WHEELS

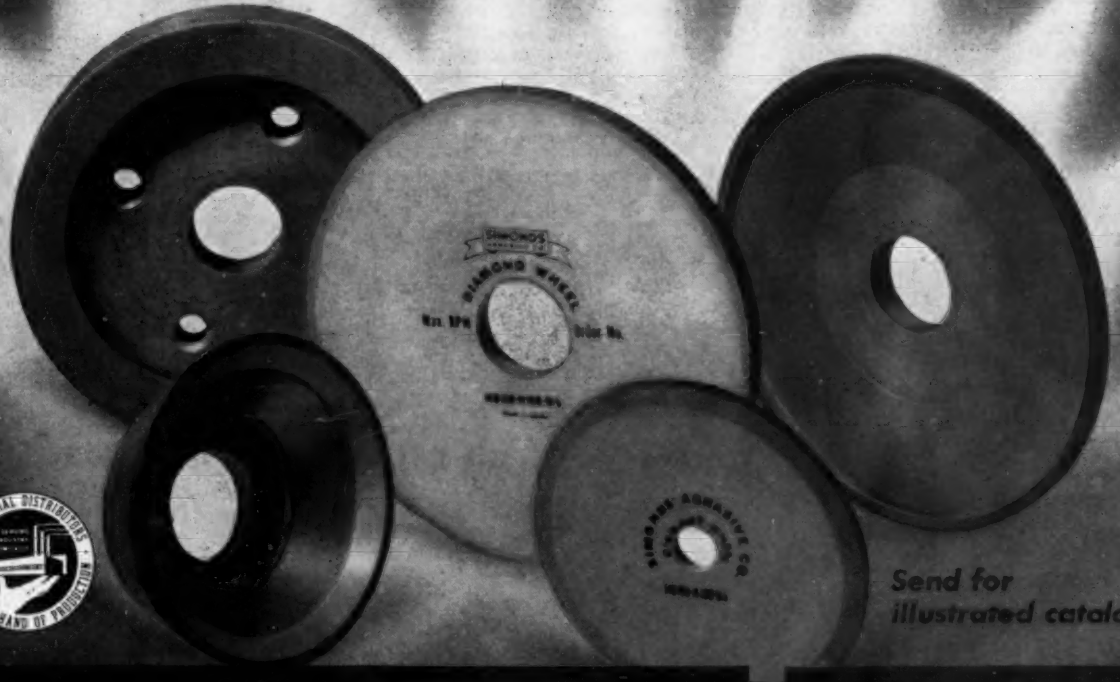
THE COMPLETE LINE IN EVERY RESPECT

Man-Made or Natural Diamonds

All standard shapes, sizes, diamond depths and concentrations... man-made or natural diamonds in resinoid and vitrified bond. Natural diamonds also in metal bond.

For finishing, semi-finishing and roughing; for carbide tipped single and multiple point tools, chipbreakers; for cutting-off and slotting; cylindrical, internal and surface grinding; electrolytic grinding, lapping and hand honing.

Part of SIMONDS complete line of grinding wheels, other bonded abrasive products and abrasive grain, including silicon carbide vitrified wheels also popular for cemented carbides.



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Proven products
Dependable know-how
Quick supply

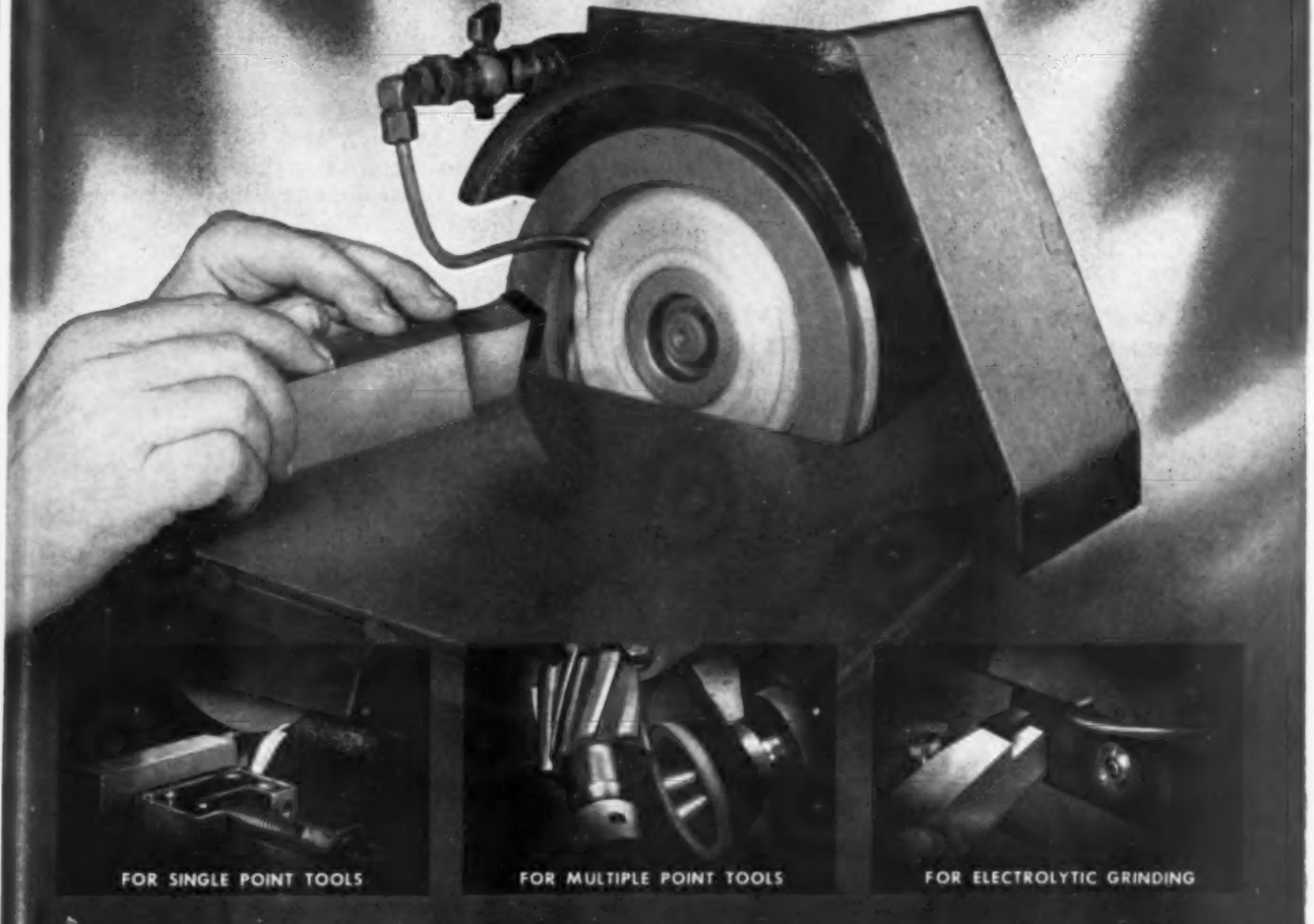
SIMONDS
ABRASIVE CO.

DIAMOND WHEELS

featuring the new MAN-MADE Diamonds
up to 35% more efficient for cemented carbides!

Faster cutting action and longer life . . . proven by actual grinding tests! Measured in terms of cubic inches of carbide removed per cubic inch of wheel wear, efficiency ratios averaging up to 35% greater clearly demonstrate the superiority of MAN-MADE diamonds over natural.

Simonds has established an entirely new manufacturing department for the production of "man-made diamond" wheels, embodying the latest machines, equipment and technology in diamond wheel manufacture. For best results specify "man-made" diamonds . . . from SIMONDS!



FOR SINGLE POINT TOOLS

FOR MULTIPLE POINT TOOLS

FOR ELECTROLYTIC GRINDING

. . . wherever abrasive operations are performed

News of Metalworking

Outlook for Business For the Rest of '58

Farm Equipment Industry—After a slow start, sales of farm equipment improved substantially in March and April and continued to improve in May. Industry's shipments in dollars and units appear to be ahead of last year at this time, and this situation is expected to continue through the rest of 1958.

Aircraft Industry—There should not be any large changes ahead; however, there are serious technical changes because of the demand for better weapons. The industry is being asked to accomplish in five years what normally has taken fifty years.

Appliance and Electrical Machinery Industry—Sales of this industry will show a rising tendency reflecting the expected improvement in general business conditions, but total sales for the year will fall short of the all-time record set in 1957.

Automobile Industry—New passenger car sales will continue on about the same level as the first half. The final quarter should show sales on an ascending basis, with continued improvement in the share of the market going to compact and smaller cars.

Railroad Industry—The level of freight traffic has fallen more than 25% between the start of the drop in industrial production at the beginning of 1957 and the spring of 1958 because of the durable goods recession. Earnings for the industry as a whole should improve moderately.

—*The First National Bank of Chicago.* •

ASTE Western Tool Show Sept. 29-Oct. 3

DETROIT: The American Society of Tool Engineers Western Tool Show and Convention will be held September 29-October 3 in Los Angeles at the Shrine Exposition Hall and the Biltmore Hotel. Registration card and brochure of the technical conferences, panel discussions and daily schedules may be obtained by writing ASTE headquarters, 10700 Puritan Ave., Detroit 38, Mich. •

Break-Through In Data-Processing Know-How

NEW YORK: A system called the Orthotronic Control, for accuracy in electronic data-processing by correcting mistakes "on the fly" at electronic speeds, has been announced by the Datamatic Div., Minneapolis-Honeywell. The system literally re-creates source data by a form of electronic detective work and provides instant data reconstruction of lost or garbled words or figures. This now makes possible no interruption of the lightning-fast operations by the worker. •

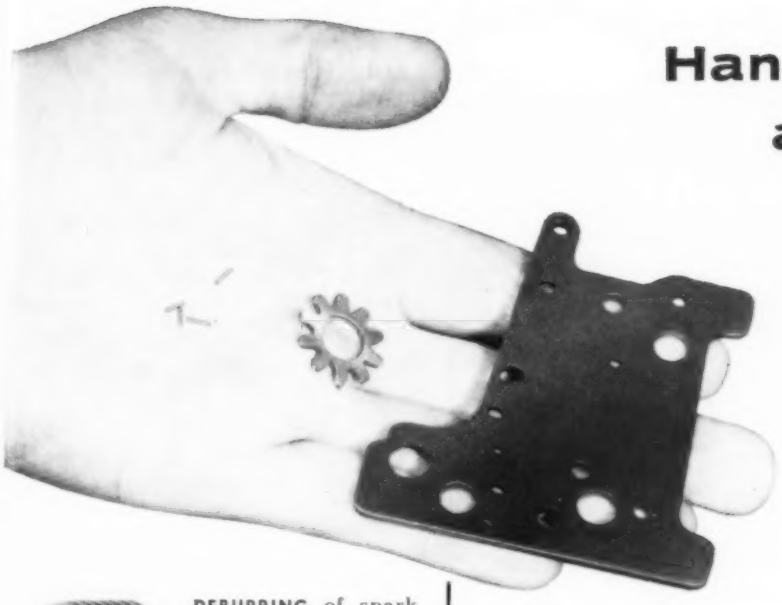
Missile Makers Urged to Build Efficient Arsenal

LOS ANGELES: Ronald R. Smelt, Director of Research and Development for Lockheed Missile System's Division, called on the nation's missile makers to build versatility into their products so that the United States can maintain an efficient and ready missile arsenal which won't become obsolete overnight.

Single-purpose missiles are not practical or economical, said Smelt, speaking before the American Rocket Society meeting at the Statler Hotel. The 1500-mile ballistic Polaris, spoken of as a versatile missile, will be small enough to be carried in atomic-powered submarines in considerable numbers. Because of its many advantages, Navy planners are considering its adaptation to other uses. •

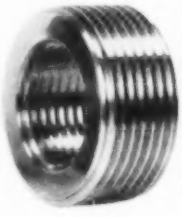
Rise in Sale of Machine Tools

WASHINGTON: New evidence of the receding recession was revealed in the upsurging sales of used machine tools, with monthly compilation of June sales showing a healthy 12.4% increase over May dollar volume, according to figures compiled by Ernst & Ernst for the Machinery Dealers National Association. Officials of the Association see the rise as indicating a new upturn of industry confidence in the future. •



Hand Your Deburring and Finishing Problems to ALMCO...

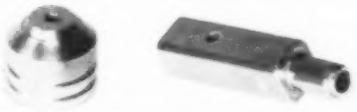
These companies did... and cut costs, improved quality, increased production.



DEBURRING of spark plug bushings by hand formerly caused many rejects at Canadian Pratt and Whitney. Costs were $104.20 per M with rejects totalling 12½%. Two Almco barrel finishing machines cut costs 97%, practically eliminated rejects.

SMALL GREASE GUN COUPLER JAWS (½" x ⅜") couldn't be deburred manually at a midwest screw products firm. With an Almco barrel finishing machine, 40,000 coupler jaws can now be deburred in 10 hours. Jaws are smooth, uniform, ready for plating.

DEBURRING AND POLISHING by manual methods proved expensive for delicate instrument and fountain pen parts at J. Bishop & Co. Almco barrel finishing machine increased output from 200 to 6000 parts per hour, cut costs 98.8%. Annual savings: $6,917.50.



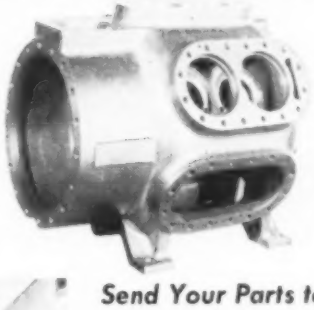
INCREASED PRODUCTION quotas demanded faster finishing at Alco Valve Co. Hand deburring and polishing finished only 200 stainless steel parts per hour. Almco machines are now barrel finishing over 1400 per hour, and to stricter finishing specs. Plant production needs are easily filled.

FILING burrs by hand formerly cost $55 per 100 needle plate forgings at Landis Machine Co. Now an Almco barrel finishing machine has cut finishing costs to 55 cents per 100 parts. Parts are uniform, rejects are eliminated. Savings come to 99%!

HEAVY WORK LOADS of roller bearings presented serious finishing problems at Timken's Columbus, Ohio plant. Now special heavy-duty Almco barrel finishing machines are processing two tons of rollers per load. And 50% of floor space has been saved, finishing costs have been slashed.

Large Parts too are Almco Barrel Finished!

AT AN IOWA FOUNDRY, an Almco barrel finishing machine deburrs, polishes 48 large wash machine agitators per hour. Fixtures hold castings firmly within Almco barrel. Rough edges are completely removed; castings are highly polished; appearance is improved.



AT AIR CONDITIONING FIRM, compressor housings weighing over 100 lbs. are Almco barrel finished. Almco process breaks sharp edges of castings, cleans internal surfaces, and improves surface finishes. Two housings are cleaned in 20 minute cycle! Workmen are relieved for other plant tasks!

Send Your Parts to Almco's Modern Test Laboratory.

Sample parts processed without obligation. Simply write on letterhead, sending parts direct to Albert Lea, enclosing specifications required. Complete, free report includes recommendation. 52 PAGE HANDBOOK ON BARREL FINISHING SENT ON REQUEST.

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QUEEN PRODUCTS, INC.

139 Marshall Street • Albert Lea, Minnesota

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Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England.

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HIS JOB

....TO BUILD
YOUR PROFITS!

THE *Roto-Finish* CUSTOMER'S MAN

There's nothing unique about stressing product quality. But, at Roto-Finish we have an added incentive. The success of the Roto-Finish Customer's Man *depends* on providing the kind of dependable, mass-production finishing service which builds customer satisfaction, and results in a steady repeat business.

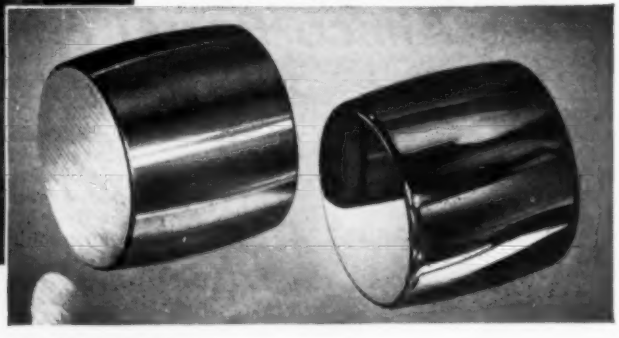
TRIAL AND ERROR FINISHING IS COSTLY

If you're now barrel finishing, our Customer's Man will welcome an opportunity to work with you in your own plant to show you how to get the finish you want, faster, and at lower cost.

If you're hand finishing, he can show you how to save up to 80% of your present finishing costs.

WANT PROOF? Then write or phone your Roto-Finish Customer's Man today.

ROTO-FINISH CASE HISTORY



*This photo is unretouched.

MATERIAL: Bearing steel, 61 Rockwell C Scale.
DIMENSIONS: 1.213" dia. x 1.015".
FINISH BEFORE: Ground to 10 RMS.
FINISH AFTER PROCESSING: 2 to 4 RMS,
(with no dimensional change).

Roto-Finish COMPANY

3730 Milham Road
KALAMAZOO, MICHIGAN
Phone: Fireside 3-5578

ROTO FINISH

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News of Metalworking . . .

1,021 Handicapped Employed by Du Pont

WILMINGTON: Du Pont is one of 51 companies cooperating on the Delaware Governor's Committee in a move to encourage employment of the physically handicapped. A majority of the more than 1,000 handicapped employees have achieved average-or-better levels of job performance, safety, and attendance. Some of the best performers have the most severe handicaps—amputation, blindness, deafness, and paraplegia. •

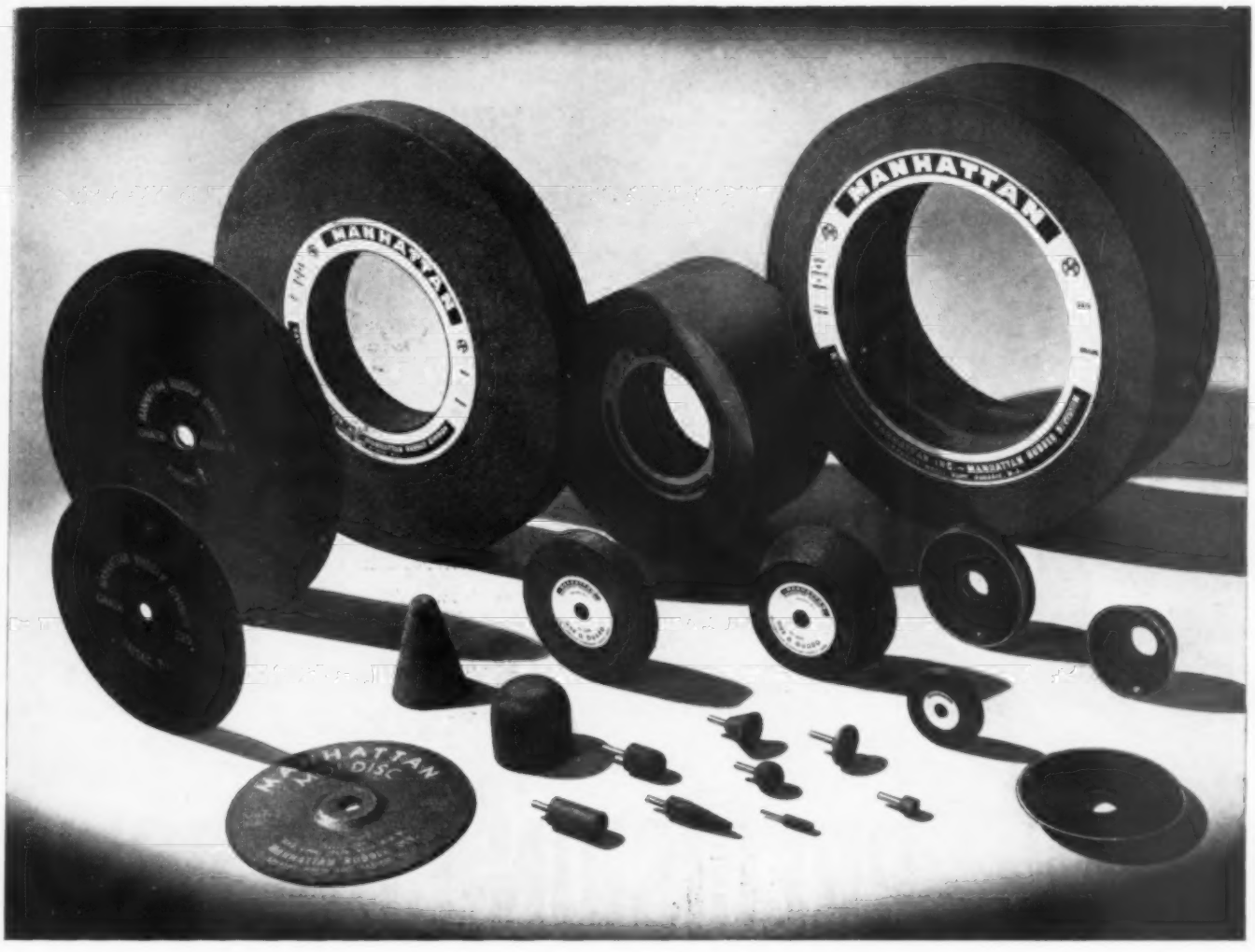
Growth of Financing In Industry Last 10 Years

CHICAGO: "Who Uses Commercial Financing—And Why?" is the title of a study available. It indicates that commercial financing is used mainly by growing companies whose production and sales are outrunning their working capital. There has been a great growth of commercial financing and factoring in 34 manufacturing industries during the last ten years. Copies of the study may be obtained by writing to the Foundation for Management Research, 121 W. Adams St., Chicago 3, Ill. •

Cutting Tool Life Shortened By Machining Uranium Compounds

DETROIT: The turnover in cutting tool designs for machining uranium compounds will be 72% greater than those used for machining conventional metals, Ken Fisher, president of Super Tool Co., predicted. Nuclear scientists, in researching for better uranium compounds, change the structure of the "hot" materials so frequently that tool redesign is almost a production-line problem. •

Steel buildings in color are possible because of the development of a durable, low-cost, factory-applied color coating by Stran-Steel Corporation of Detroit. Called Stran-Satin Color, the vinyl-aluminum coating withstands exposure tests and will not blister, crack or lose color.



MANHATTAN ABRASIVE WHEELS

Faster Grinding — Longer Life

Whatever the job—cutting, rough grinding or finishing—there's a Manhattan Abrasive Wheel engineered to remove *more* metal, *faster* . . . at *lower* cost. Every component of the type wheel you specify—abrasive, grain size, hardness, structure and bond—is custom-designed by Manhattan for your particular requirements in cutting and grinding on steels, light metals and alloys. The result? More output per man hour . . . more production for your abrasive wheel dollar!

A Manhattan abrasive wheel specialist is prepared to help you determine the best wheel for your operations. Let him show you how to boost production and reduce costs with Manhattan high speed, heavy duty abrasive wheels.

RM-846

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

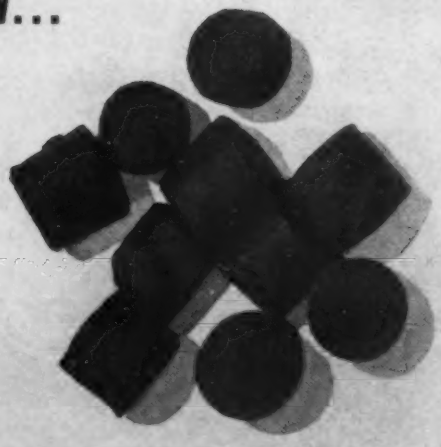
Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

NEW...

ALUMINUM OXIDE TUMBLING NUGGETS

Fused Aluminum Oxide Tumbling Nuggets provide a fast cutting action for grinding, deburring, and polishing and require no breaking-in period. Their long wearing qualities help minimize the problem of lodging in parts. They are designed especially for precision barrel finishing.

NEW...



ALUMINUM OXIDE VITRIFIED TUMBLING PELLETS

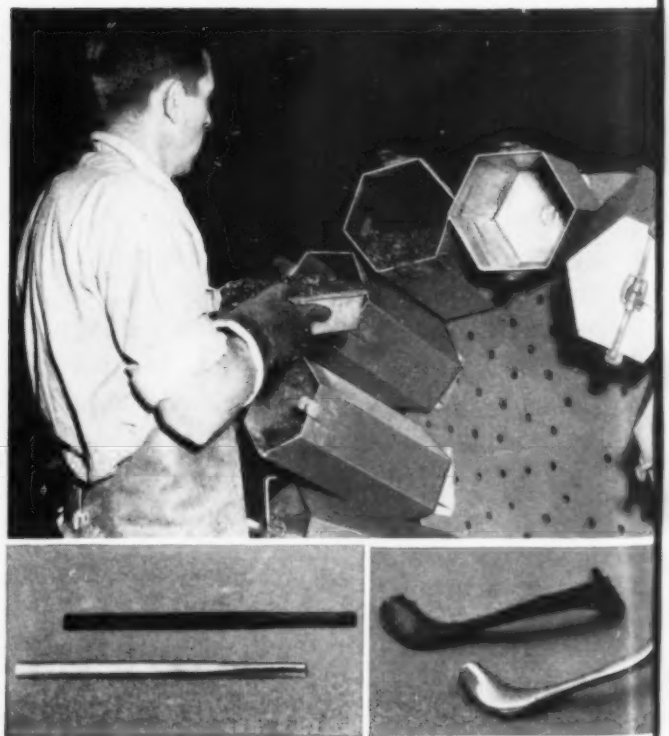
Aluminum Oxide Vitrified Tumbling Pellets are controlled bonded shapes manufactured under the same rigid quality standards as other bonded abrasive products. The grit, grade, and bond are precisely formulated to give maximum "cut" with minimum wear. They are particularly advantageous where lodging must be prevented and where a rapid rate of cut is desired.

NEW...PRECISION-CONTROLLED

NEW...

"CARBO-BRITE"

An electric furnace product having a fine crystalline structure and slow wearing qualities which adapt it to light burr removal and high finish operations where high color is desired. Its weight, somewhat heavier than nuggets, makes it specially suited for burnishing operations.



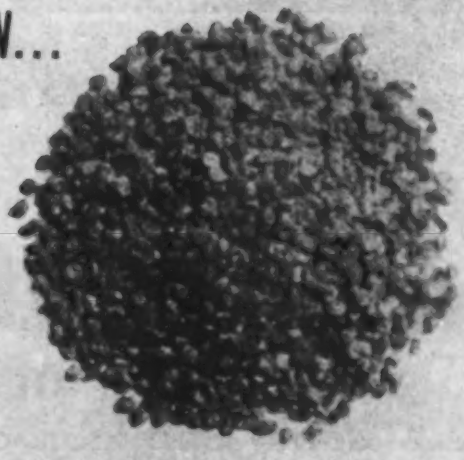
Typical Parts Finished with CARBORUNDUM *Tumbling Media Showing "Before and After" Illustrations.*

NEW...

"CARBO-RUBS"—RUBBER BONDED TUMBLING MEDIA

"Carbo-Rubs" are parallelogram-shaped rubber bonded tumbling media. They are used primarily where the burr is light and action must be gentle. Their most popular use is to prepare a surface for high "color" and remove burrs from non-ferrous parts.

NEW...



ALUMINUM OXIDE TUMBLING GRAIN

Aluminum Oxide Tumbling Grain is Fused Aluminum Oxide specifically designed for the most economical results in tumbling small metal parts. It may also be used as an additive to augment the cut of various other tumbling media. Coarser sizes are used in the new "spinner-type" finishing equipment. Available in a wide range of types and grit sizes.

ED. TUMBLING MEDIA

for all barrel finishing operations... deburring...

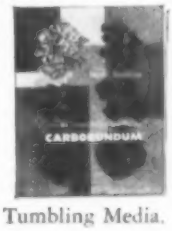
scale removal... polishing... honing... blending... burnishing

Faster, More Uniform Metal Finishing At Low Cost

Manufacturers of metal parts which require deburring, scale removal, polishing, honing, blending, or burnishing operations can now produce finer finishes *at lower costs* by using the new *precision-controlled* Tumbling Media by CARBORUNDUM. New improvements in the manufacture of abrasive media at CARBORUNDUM assure exceptionally high output per barrel with absolute uniformity of parts and finishes. Even unusual shapes and sizes can be mass-finished to precision tolerances... at a fraction of the time and cost... thanks to precision-controlled tumbling abrasives by CARBORUNDUM. CARBORUNDUM'S wealth of abrasives 'know-how' is readily available to assist manufacturers in working out their specific parts finishing problems. Write for further information.

MAIL THIS COUPON TODAY

Write for this FREE Booklet A practical guide describing barrel finishing of metallic parts on a mass production basis using Tumbling Media.



THE CARBORUNDUM COMPANY
Dept. GF83-816
Niagara Falls, New York

Tell me more about "Precision-controlled" Tumbling Media.

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____

For expert advice... Ask the Man from

CARBORUNDUM

REGISTERED TRADE MARK

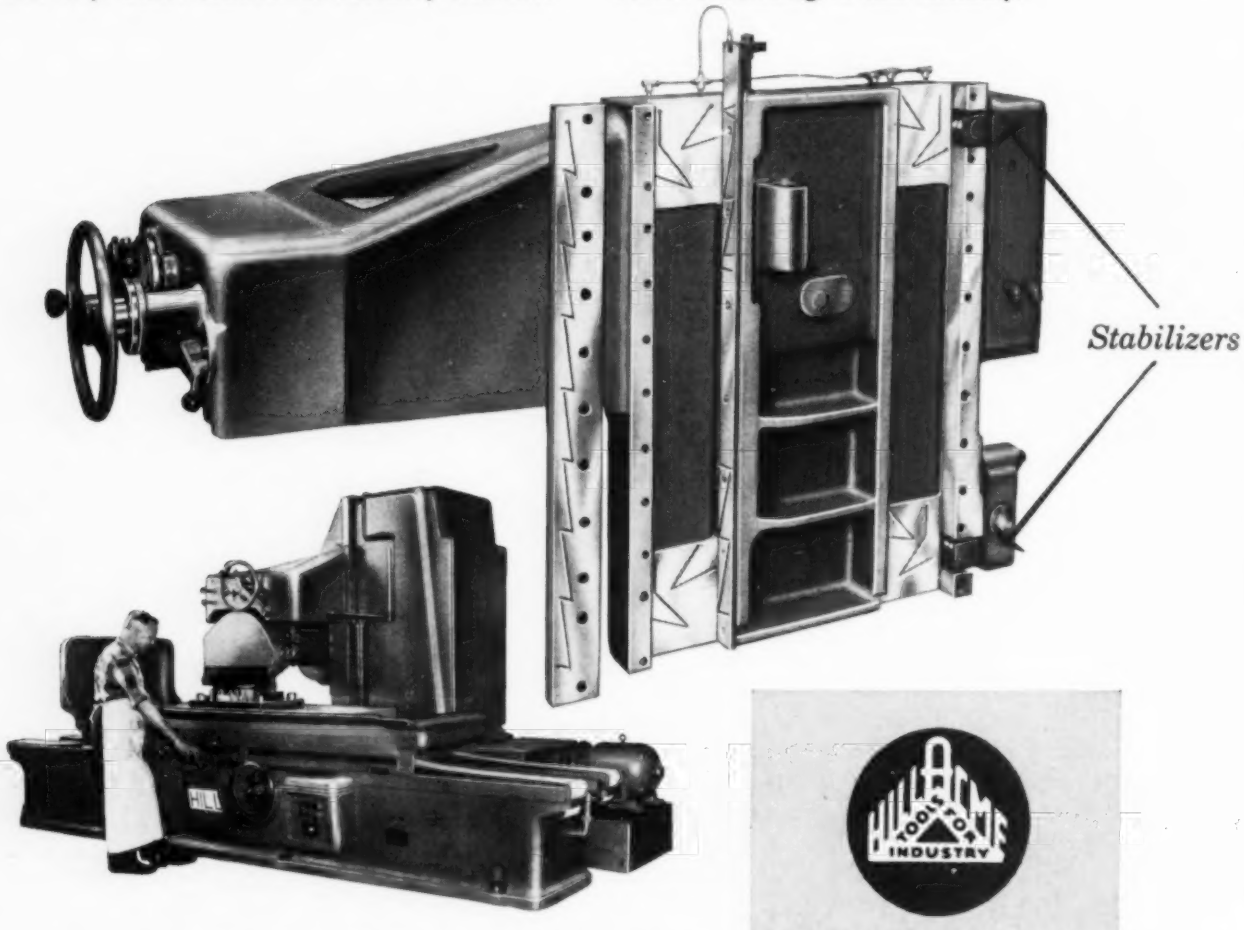
For information about any advertised product, see the Advertisers Index and Action Card inside back cover

ONE REASON FOR THE PERMANENT ACCURACY

of HILL Surface Grinders

We believe that PERMANENT ACCURACY is basically a matter of engineering design. One of the reasons for the extreme precision of HILL Hydraulic Surface Grinders is the unique method of keeping the Horizontal Spindle saddle in perfect alignment.

The Horizontal Spindle saddle, on which the spindle motor and wheel head are mounted, is a heavily ribbed alloy casting which is normalized before finish machining. Note the stabilizers at the top and bottom of the right hand way. These control the necessary clearance for oil film between the saddle and the column. These stabilizers are spring loaded, cam follower type bearings and keep the saddle in perfect alignment at all times, supplementing the taper gib that is shown projecting above the saddle. Note also that the center portion of the saddle ways and the center section of the adjustable tapered gib are undercut to insure perfect contact with the column ways indefinitely. This is an exclusive HILL feature that eliminates the necessity of future rebuilding of this assembly.



HILL ACME TOOLS TO THE INDUSTRY

HILL Horizontal Surface Grinders are built in table lengths of 72" to 240" and in table widths of 24", 30" and 36". Also built in vertical spindle design. Detailed description in Bulletin HV 58.

THE HILL ACME COMPANY

1207 W. 65th STREET
CLEVELAND 2, OHIO

. . . wherever abrasive operations are performed

EDITOR'S PAGE

YOUR PART

According to the most recent U.S. Dept. of Commerce *Facts for Industry* report, 1957 shipments of cutting type metalworking machines totaled 793 million dollars. Of this total 120 million was spent on grinding machines. Two other categories should be included in evaluating our field. These are the gear cutting and finishing machines and the miscellaneous, which includes honing, lapping, polishing, buffing and cut-off machines. If we take the liberty of halving these last two categories, we have a total grinding and finishing machinery shipment of 198.3 million, or one fourth the cutting type machinery market.

To this figure we must add the shipments of abrasives and the accessories such as gages, fixtures, automatic handling equipment, coolants, coolant cleaning equipment, dressers, etc. Abrasive sales for 1957 amounted to approximately 250 million dollars and it is quite likely that accessory sales were at least a fourth of that figure.

This in turn means that you, the reader of GRINDING and FINISHING, are part of a 510.8 million dollar industry. This is a very impressive figure next to the total of 793 million for all the cutting type machine tools.

To further emphasize the importance of your field, stop now and try to think of any item which has not been ground, finished or produced by equipment which has been ground or finished. It is nearly impossible.

This all adds up to a very important part of the country's production. It also means that you have a tremendous responsibility and that we of GRINDING and FINISHING have the same magnitude of responsibility to you. To fulfill this responsibility we will present to you basic facts concerning all abrasive operations, the outlook on new developments in the field and reports on the most successful operations or progress now in effect.

In this issue you may read basic information on the use of coated abrasives and barrel finishing, the outlook of new developments in diamond dressers and automatic gaging, and a report on a very successful tool room cost program at International Harvester. We invite your comments on these articles and those of future issues. It is through these comments that we are better able to fulfill our obligations.

M. M. Patterson

MANAGING EDITOR

Control Reduce

A control program like this will give you . . .

More tools ground per man-hour

Better scheduling of grinding

Tool inventories balanced with production requirements

SEPTEMBER, 1958

By **Jules Caldwell**
Assistant Mechanical Engineer
Indianapolis Works
International Harvester Company
as told to Dick McKee

● Rush orders for tool grinding to head off or shorten a production slowdown . . .

Many short runs of tool grinding; considerable set-up time for such runs . . .

Grinding tools for one production department while tools of the same kind are lying unused in another department . . .

Production supervision getting tools from salvage, bypassing tool stores . . .

A tool grinding department that "grinds tools," but where such items as how many and what kinds of tools are ground, and how much it costs to grind them, are either vague or unknown quantities . . .

Reduction or increases in tool inventories on a minus or plus "across-the-board" percentage basis . . .

These and similar problems are common to many tool grinding departments. They are not imaginary, nor are they easy to lick. In production lines, while there are many intangibles, grinding costs come down to a basic concept of so many wheels used, at so much per wheel, to grind so many units.

In a very broad sense, the same thing is true of tool grinding. But the variety is so great, and the runs, in a production sense, so short, that collecting costs has frequently been regarded as an insoluble problem, or at best one in which the remedy would be more costly than the disease. That this is not true has been borne out by the experience of International Harvester's Truck Engine Works at Indianapolis, where a program of tool control and planned tool grinding has been in existence for somewhat more than four years. The men in charge would be the first to admit that it is not perfect; but what they have now is much better than what they had four years ago. It is an approach that contains much of interest to any tool grinding supervisor or superintendent.

Total Tool Investment Lowered

Though there was a substantial cost in bringing the tool inventory up to a point at which the program could operate, in the end the total investment in perishable tools was less because of previous overstock on many items. The trend since that time has been toward reduction of tool grinding costs, and what is more desirable, considerably fewer delays in production as a result of lack of tools. In four years the system has been refined to a point at which the grinding costs of tools for almost any production set-up in the manufacture of truck engines can be readily determined.

No added clerical help has been required, though at first glance the records appear to be quite detailed.

Grinding Costs not Isolated

At the outset, it must be admitted that tool grinding costs do not exist in a vacuum. No company grinds tools simply for the sake of grinding tools. The cost of the operation is inextricably bound up with a program of tool control. It is of no use to grind tools economically if they are subsequently lost, or hoarded, or lost track of in a tool crib somewhere. The folly of grinding tools that do not "produce" is equally obvious. On the other hand, until we reach the time when beyond question it is cheaper to use a tool once and then discard it, tool grinding and its consequent costs will be a part of any tool control program.

Set-up time is a problem in any tool grinding department. In fact, it was the problem of tearing down and setting up for emergency grinding of tools, if one factor were to be singled out, that focused attention on the problem of tool grinding costs at Indianapolis Works. Only a little study was required to point out some of the difficulties.

A survey indicated surpluses of tools on some jobs, lack of adequate inventory of tools in other departments, and in general the sort of situation indicated in the introduction.

Inventory Record and Estimated Requirements

Following the survey and approval of a proposal to change the set-up the next step was to set up a form for the recording of inventory and estimated

ool Grinding Costs

Fewer production delays

from tool shortages

Less rush tool grinding

Less set-up time for grinding

requirements for perishable tools. (Figure 1) Starting from an estimate of the number of tools of a particular kind needed for a twenty-four hour period (Column 3) the inventory is broken down into three "banks"—one on the job, one in the tool crib, and the third in the Tool Grinding Department (Column 5, 6, 7). The "job bank" is somewhat more than is required for three-shift operation, to allow for breakage and other emergencies. The "tool grinding bank" is set at a level which will allow for the orderly scheduling of grinding replacement tools when the "crib bank" and "job bank" reach a predetermined level. Thus, for instance, if 8 tools of a particular type are normally required for twenty-

ATTENTION: EARL GOOD

CC: P. FLICK

PERISHABLE TOOL INVENTORY
AND ESTIMATED REQUIREMENTS
BASED ON PRESENT PRODUCTION

DEPT. NO. 15

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TOOL NO.	DESCRIPTION OF TOOL	Tools Req'd. for 24 Hrs. Prod.	Actual Inventory Present	Req'd. Bank Tool Gr. Dept.	Req'd. Bank Prod.		Actual Bank Req'd.	Time Req'd. to Grind Each Tool
					Job	Crib		
5978	T.C.Co'Bore	1	3	1	1	1	3	
6434	T.C. Reamer	2	26	12	12	2	26	
6527	Broach	18	54	24	12	18	54	
6736	CHAMFER TL.	1 WK.	7	4	1	2	7	
6958	1/4" Drill	1	14	12	1	1	14	

Paul Flick

GENERAL FOREMAN

Figure 1

four hour operation (which might be one, two or three shifts depending on level of production), the job bank might be 12; the tool crib bank, 24, and the tool grinding department bank, also 24.

No tools of that kind would be sharpened until the "tool grinding bank" was down to a pre-determined level. There are times, of course, when either breakage, unusual wear of tools, or the fact that the stores crib has not had a chance to order, will modify this rule, but in general it holds. Trying to maintain all three banks at their pre-determined levels assures all concerned that an adequate number of tools are in circulation.

These considerations contribute to orderly scheduling of work in the tool grinding department.

The time required is based on estimates by the tool grinding foreman and on plant experience. Data accumulated from tests, however, make these much more accurate than the usual "guesstimate." The actual inventory present (Col. 4) was significant when the program was being established, but is now mostly used for control purposes.

Less Emergency Grinding

Control, of course, is the purpose of the program. Now, when a production foreman comes in with a rush order for tool grinding, he must first account for the job bank which he is charged with. This is not to say that there is no emergency grinding of tools, for honest-to-goodness emergencies still come up, but they are much rarer than they used to be. However, the fact that the job bank is exhausted, by itself, is no longer considered an adequate reason for emergency grinding.

Better Inventory Adjustment

A second advantage of such a record lies in its use for adjusting either to increases or decreases in production. In conjunction with other forms, it enables management to make either type of adjustment on a factual basis, rather than on a straight percentage cut or increase. Under current conditions, it has been possible to accomplish a substantial decrease in tool inventory—the exact figure is not pertinent—and still meet production requirements.

For the most part, requisition or "buying" of tools is on a tool-for-tool basis. Incidentally, the term used is "buy" rather than "requisition," whether the material is obtained from inside or outside the plant. That is, the production department must turn in one tool for each one it secures from the tool crib.

Tool Stores Records

Daily and weekly records are maintained of dull tools which go into and sharp tools which go out of the tool grinding department, though only the weekly record is illustrated. (Figure 2).

Ideally these would balance, but in practice the tools sent out of tool grinding are always less, largely because of worn out or broken tools. The data on tools in and out of tool grinding are assembled by the foremen, of whom there are three, and consolidated by the general foreman. The form provides a convenient overall record of departmental production.

The types of tools shown on the daily records of dull tools received and sharp tools delivered by the various tool cribs are the same as those in Figure 2. Each crib attendant records by type the number of tools received and delivered each day. However since the only information on the form which is different from Figure 2 is the date, crib number, and signature of the attendant, these records have not been illustrated. They could easily be adapted from Figure 2.

New Tools

A key feature of the tool control program is the centralization of responsibility for procurement in the tool stores department under the direction of the perishable tools research engineer. To understand how the system works, however, it is necessary to go back to the way it was done before 1954.

Like all plants in similar circumstances, Indianapolis Works has a salvage section into which all scrapped tools, among other things, are sent. Some of these tools may be quite usable; in fact, in many cases they may be new. But when a model is discontinued, or when production is shifted to another location, or when for any number of sufficient reasons they are no longer required on the job for which they were acquired, they are written off and sent to salvage. Many of these tools are suitable for other applications with relatively little grinding.

Tool Stores Formerly Ignored

Up to 1954, a production foreman might find in salvage sufficient tools of a particular kind to last his department for some time, possibly as long as three months. In such a case, he could requisition them directly from salvage.

The by-passing of tool stores might also happen when worn tools were butt-brazed in the grinding department to make usable tools. Then when his supply of the tool was exhausted, and there were no more available from salvage or from butt-brazing, he would request some from tool stores, where of course there would be no record of his department's usage during the time when the salvaged tools were being used. The confusion can be easily imagined.

Tool Requests Now Centralized

Now, however, all requests from production departments for new tools are routed through tool stores. The first step in filling the request is to check salvage to see if there is anything available which can be converted for use on the production line. If so, the tools are ordered through tool grinding on what is called a "960" order, originated by tool stores, and the production department is charged only reconditioning costs.

Suppose that new tools of the type in question cost $10 each, and that the reconditioning cost is $1.50. If a department needed two dozen of such tools, and there was one dozen in salvage, it would "pay" $18 for the salvaged dozen, and $120 for the dozen purchased new. Thus, the savings resulting from wider use of salvage are passed along to production, and still the records of tool usage are straight for future orders for tools.

It is estimated that perhaps 90% of all tools currently used are processed on these "960" orders. This policy, however, is flexible. Today, the department

DULL TOOLS RECEIVED AND TOOLS REGROUND

WEEK ENDING 3-30-58

TYPE OF TOOL	Monday		Tuesday		TOTAL		
	Recd.	Grnd	Recd.	Grnd.	Recd.	Grnd.	Hours
H.S.S. SINGLE PT. TOOLS	19	108	19	82	88	608	
CARBIDE SINGLE POINT TOOLS	303	289	311	165	1936	1299	
CRANKSHAFT FORM AND CHECKING TOOLS	873	742	1123	756	4488	4045	
H.S.S. INSERTED BLADES MILLING CUTTERS	65	31	53	21	269	188	
CARBIDE INSERTED BLADE MILLING CUTTERS	47	56	39	58	204	228	
SPOTFACERS AND COUNTERBORES	52	27	31	24	239	174	
CORE DRILLS DEPARTMENT -- 5	30	30	42	-	173	130	
T. C. REAMERS DEPARTMENT -- 5	-	29	-	20	0	101	
CHAMFER TOOLS DEPARTMENT -- 5	1	49	11	13	31	101	
DRILLS	359	213	428	371	2510	1593	
DEEP HOLE DRILLS	574	300	577	248	2189	1433	
REAMERS	114	33	62	58	453	163	
HOBS	21	17	35	28	137	143	
ROUND BROACHES	62	11	45	41	278	189	
FLAT BROACHES	1	22	2	42	11	79	
FORM TOOLS	-	26	2	24	16	55	
BORING TOOLS	111	224	121	139	554	788	
BORING BARS AND HEADS	-	8	4	24	32	47	
TAPS AND CHASERS	85	12	152	-	510	94	
TOTAL	2717	2227	3057	2114	14,119	11,408	

Vacations _____ Hours

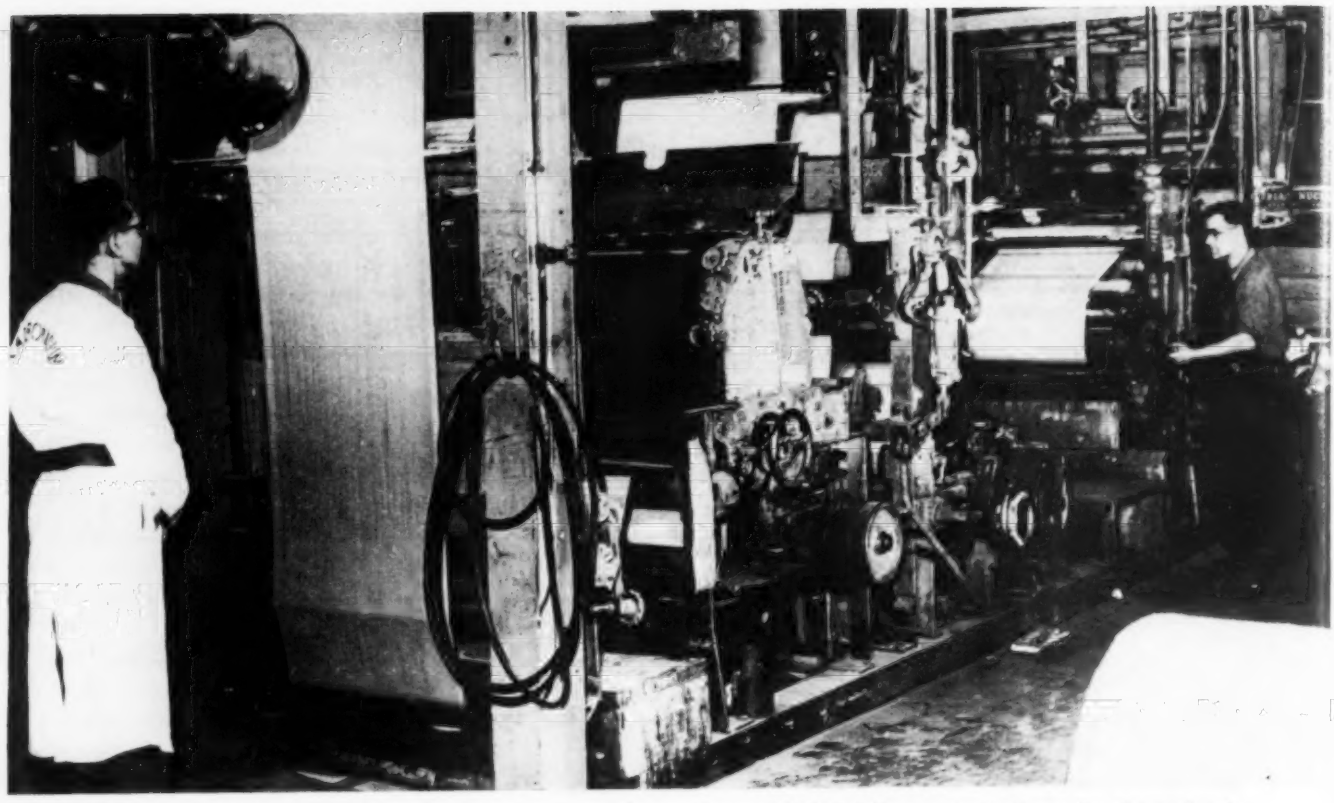
Absenteeism 329.50 Hours

General Foreman Paul Flick

Figure 2

has time to make more tools than are needed by the plant, and it has even been possible to solicit tool grinding from other plants of International Harvester. This is, of course, a result of the fact that in a down trend, the need for normal tool grinding decreases faster than total man-hours available for grinding in the shop, as the plant tool inventories are worked down. However, in times of high production, the situation is reversed and tools are bought outside to supplement what are made in the plant. Accurate records of grinding costs make it easier to decide between "do-it-yourself" and outside purchase on a factual basis.

(Part 2 of this article will be published in October.)



Coated abrasive making machine processes up to 10 miles of coated abrasive in one run. Electronic devices insure high fidelity control of quality throughout.

Select Better Coated Abrasives

by **Clayton J. Holland**
Engineer, Product Design & Application
Coated Abrasives Division
The Carborundum Company
Niagara Falls, New York

● To many of its users, "sandpaper" is sandpaper —sometimes coarse, sometimes fine; sometimes black, more often tan, but still sandpaper. And most of these same people, with only a little knowledge of "coated abrasives," can get better results from their work, to say nothing of saving themselves time and money. In the wide variety of coated abrasives available today, there is a "best" type for each application, and an understanding of their properties will help any user to come closer to the best for his particular purpose.

In fact, to anyone accustomed to thinking of coated abrasives in the form of sheets of "sandpaper" which can be wrapped around a block of wood and used for smoothing up wood before it is painted, the present-day variety may be little short of astonishing. Once thought of primarily for woodworking, they have been finding a constantly widening area of applications in metalworking. They come in a variety of forms. Belts are probably most widely used in

Check these points . . .

- √ *Grit size and type of abrasive*
- √ *Flexibility of backing material*
- √ *Type of adhesive*
- √ *Kind of coating*

industrial applications, but discs for both portable and stationary equipment, sheets in many shapes, "cartridge rolls" and coated abrasive cones for portable grinding and finishing, and "flap-type" wheels are some of the other forms which are manufactured. The coarsest belts remove metal at an amazing rate; the finest produce very low microfinishes on all types of material.

Since any coated abrasive consists of a layer of abrasive attached by an adhesive to a backing of cloth, paper, or some similar material, it follows that variations in any one of these three components or in the method of manufacture will make a difference in the performance of the finished material.

GRIT SIZE

Principal differences in the abrasive are in the size of the grains (grit size) and in the type (material which makes up the abrasive).

The grit size number in general indicates the number of openings per linear inch in the screen used in grading the abrasive. The larger the number, the finer the abrasive will be. For instance No. 20 grit will just pass through a screen with 20 openings per inch, but will not pass through one with 24 openings per inch. Grit sizes 12, 16, 20, 24, 30, 36, 40, 50, 60, 80, 100, 120, 150, 180, 220 and 240 are graded in this fashion. Sizes 280, 320, 400, 500 and 600 which are very fine, are graded by other means. The important thing for casual users to remember is that coarse grits 24 grit and coarser, cut faster and remove more stock, but leave a rougher finish. Fine grits, usually considered as 120 and finer, produce a smoother finish, but do not remove as much stock and become clogged or "loaded" more quickly. Medium grits, 30 to 100, offer a variety of combinations of stock removal and finish.

TYPE OF ABRASIVE

The abrasive used for most sandpaper today is either aluminum oxide or silicon carbide, both being manufactured minerals. A few natural abrasives, however, such as garnet, flint and emery, have specialized uses.

Aluminum oxide is the most widely used abrasive grain. Brown or tan in color, it is tough and durable. It is used primarily for grinding high tensile ferrous metals, tough bronzes, malleable iron and hard woods.

Silicon carbide, blue-black in color, is the hardest and sharpest manufactured abrasive. A friable grain, it breaks down more readily, continually presenting new cutting points. Because of this characteristic, it is often selected in preference to aluminum oxide

Automatic press disc cutting. As the cutters go up a jet of air is released under each disc, blowing it free from the scrap.

to obtain a finer scratch pattern in metal finishing operations. It is generally used for grinding low tensile non-ferrous metals and cast iron, as well as ceramics, glass and plastics.

Garnet, a reddish-brown natural abrasive, heat treated to increase toughness, is used almost exclusively for woodworking. It is generally regarded as the best abrasive for use on soft woods.

Flint, a grayish-white natural abrasive, is the softest of the abrasive grains. It is used mostly for paint removal and for sanding woodwork.

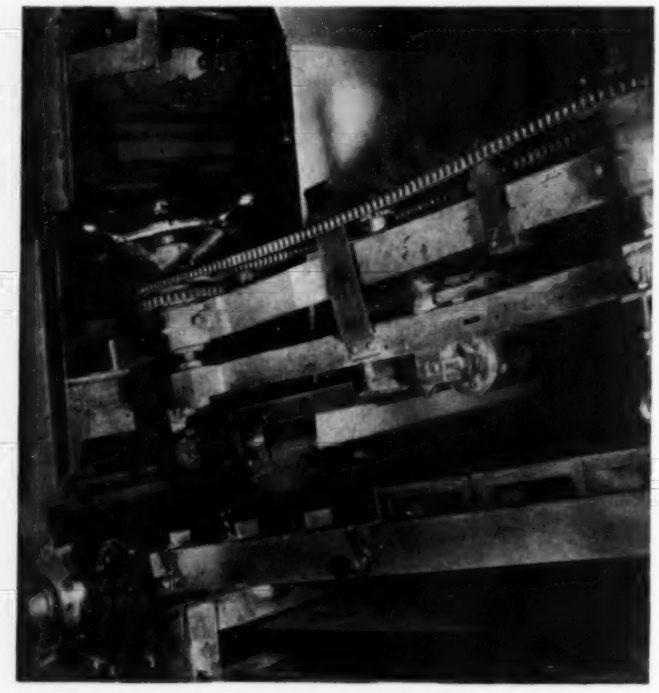
Emery, a black natural abrasive, is used primarily for polishing metal surfaces.

BACKINGS

The second major consideration in selecting a suitable coated abrasive product is the type of backing, which may be either paper, cloth, or fiber, or in some instances, combinations of cloth with fiber or paper. Generally speaking, the amount of flexibility required for the application is the primary consideration, though the strength of the backing is also important.

PAPER

Two types of paper, available in different weights, are utilized in the manufacture of coated abrasives. Fourdrinier paper, made in a single layer, combines great flexibility with high tear resistance. The "A", "C", "D" and "E" weight backings are made in this construction. Cylinder paper, made of several plies combined to provide maximum strength in the lengthwise direction, is especially adaptable for belts and drum covers and is available only in "E" weight.



Electrostatic placement of grain. The abrasive grains are projected upward by electrostatic propulsion from the conveyor belt to the moving, adhesive-covered backing.

"A" weight—40 lbs. per ream—is the lightest of all papers used for coated abrasives. Extremely flexible and soft, it is most often used for "finishing papers" for hand application in the woodworking field. It is, of course, generally coated with a fine grit abrasive.

"C" weight—70 lbs. per ream—is heavier, stronger and less flexible than "A" weight. Often referred to as "cabinet paper" or "abrasive paper"—it is usually used in the woodworking trade for hand and light machine applications such as sanding wood in the white prior to staining, fitting and other finishing coats. It is usually coated with a medium grit abrasive.

"D" weight—100 lbs. per ream—has the same uses and characteristics as "C" weight, but is coated with coarse grit abrasives.

"E" weight—130 lbs. per ream—is the strongest and toughest of abrasive papers. Because of its high tensile and ply strength, it is specified for almost all machine-sanding applications on which paper-backed abrasives may be used. These applications include belt and drum sanding, backstand grinders, wide belt sheet polishers and other similar operations.

CLOTH

Cloth backed abrasives are made in the form of rolls, belts, bands, sleeves, sheets, molded shapes, discs, and cartridge rolls for a wide variety of applications on ferrous and non-ferrous metals, wood, stone, painted surfaces, plastics, glass and leather. Because of the varying requirements for these applications, cotton backings that meet rigid specifications relative to strength, stretch resistance and flexibility are used.

Cotton cloth comes in three weights—"J", usually called jeans; "X", or drills; and "H", or twills. The "J" weight, the lightest and most flexible of the three, is the backing used in products for sanding moldings and contours in the furniture industry, for metal applications requiring extreme flexibility, (for both machine and hand sanding) and for varied operations in the shoe industry. "X" weight is heavier and less flexible. Though it can be employed for moderate contour work, it is generally specified for a wide variety of operations requiring various rates of stock removal and sufficient strength to withstand severe operating conditions. "H" weight cloth is very heavy, combining high strength and little flexibility. It is used mostly on special heavy-duty applications, and is seldom encountered.

Rayon is used in a relatively new open-mesh product called "Sand Screen." As the name implies, the material resembles wire screening. This is used on applications where clogging of ordinary coated abrasives is a problem. It is available in both aluminum oxide and silicon carbide and in sheet, disc and roll form.

Vulcanized fiber is used as a backing for sander discs, for portable disc sanding and, in a lighter weight, on very severe drum sanding operations.

In addition to the above, paper-cloth and fiber-cloth combinations are used. The first is strong paper combined with very light weight cloth to make backings for rugged service on drum sanders, when the work would rupture ordinary paper backings. Fiber-cloth combinations are used only on sander discs.

ADHESIVES

The third major consideration in selecting coated abrasives is the adhesive. The two general types of adhesive are glue and resin, which are often referred to as glue-bond and resin-bond, respectively. Each of these may be modified by the addition of calcium carbonate to improve heat resistance. In addition, resins and varnishes are employed in the manufacture of waterproof cloth and paper.

Resin bond is generally recommended rather than glue bond for severe applications because of its toughness and moisture and heat resistance. However, when the nature of the work is not rough enough to provide the dressing action required to break down a resin-bond product, a glue-bond product provides better life and a superior finish. Either a glue- or resin-bonded coated abrasive may be used with petroleum-base lubricants, but a waterproof product is specified whenever a water or water-soluble lubricant is employed.

In order of their heat resistance and aggressiveness (ability to cut) of the finished product, the various adhesives would be arranged as follows:

Glue
Glue Modified
Resin-Glue
Resin
Resin Modified

Note: Waterproof products are comparable to resin.

Waterproof materials are the most expensive of the coated abrasives. Resin bond is less expensive, and glue bond products are the lowest in price.

TYPES OF COATING

In addition to the variations in materials which have already been considered, the type of coating, the method of coating, and the amount of flexing also make a difference in the performance of coated abrasives.

The standard or "closed" coating results from a close and uniform distribution of the abrasive grain on the backing. This is the type generally specified for more severe sanding and grinding jobs. "Open-coat" material, as the name implies, has from 50% to 70% of the grain of "closed-coat" material. Designed to provide a product that does not readily load or clog, it is generally used on soft and gummy materials. "Open-coat" items also have more flexibility than "closed-coat" products of equal weight.

METHODS OF COATING

Two methods of coating are in common use. In gravity coating the grain is dropped from a hopper onto a moving, adhesive-covered backing. In the electro-coating process the abrasive grains are projected upward by electrostatic propulsion from a conveyor belt to the moving, adhesive-covered backing. This process orients the grains more uniformly in an upright position, producing a sharper cutting material than results from gravity coating.

Placing special formula adhesive on skived ends of belt preparatory to splicing. Skiving removes the abrasive from one end of the belt so that there is no extra thickness at the splice.

FLEXING

As manufactured, all coated abrasives have little flexibility. For that reason, a certain amount of "flexing", depending on the grit size, composition of the product, and the end use for which it is being made, is incorporated into the manufacturing process. Since this operation involves some mechanical fracturing of the bonding adhesive, the minimum flex consistent with job requirements is preferred.

There are two types of flexing, 90° and 45°. Flexing at right angles to the direction of the roll (90 flex) is required for most flat belt work. Flex 45 material is flexed both ways, at 45° to each side of the roll. Such flexing is imparted to material to be used in sanding contours or irregular shapes. To meet special end-use requirements, a 90+ and a 90– flex, as well as a 45+ and a 45– flex, which are degrees of flexibility greater or less than the standards of 90° and 45°, are also available.

The final selection of the best coated abrasive for a given application results from a balancing of the considerations above. Fortunately, much of the preliminary work has been done by coated abrasives manufacturers, such as The Carborundum Company, who have developed standard stock items for most uses after many years of experience on a wide variety of grinding and finishing operations. Each job, however, is unique in some respect, and may necessitate some experimentation to determine the optimum combination of a selected coated abrasive and a chosen method for using it. • • •

Tumbling Fragile Parts in Standard Equipment

- √ *Use felt for wet tumbling because of its lightness, absorption of abrasive and chemical inertness.*
- √ *Use treated cob dust for dry tumbling.*
- √ *Use combination felt and cob dust for buffed finishes.*

By **Charles Kramer**
H. W. Kramer Co., Inc.

● One of the most common problems of a barrel finishing department is the deburring of delicate parts, or parts which require completely un-marked surfaces. Recent machine developments such as the dual action vibrating and rotating units and spindle machines which rotate the parts in the media are solutions. It is also possible to make a fixture or rack to hold parts and thus reduce possible damage. The new machines, however, are quite often out of the small manufacturer's reach. Limited runs also present a problem in the purchase of these machines. Racking may eliminate surface imperfections caused by tumbling with a hard media, but it also reduces the parts per load.

Operating a laboratory for experimental and sample processing, the H. W. Kramer Co., Inc., Richmond Hill, New York, combined its metal and plastic experience to solve this finishing problem. One method of overcoming all objections is the selection of a type

A barrel being emptied after a run with felt. A non-sudsing detergent was used so that the felt would not float. The barrel has a variable speed motor.

How 7,000 pieces per hour get the "Touch of Gold"

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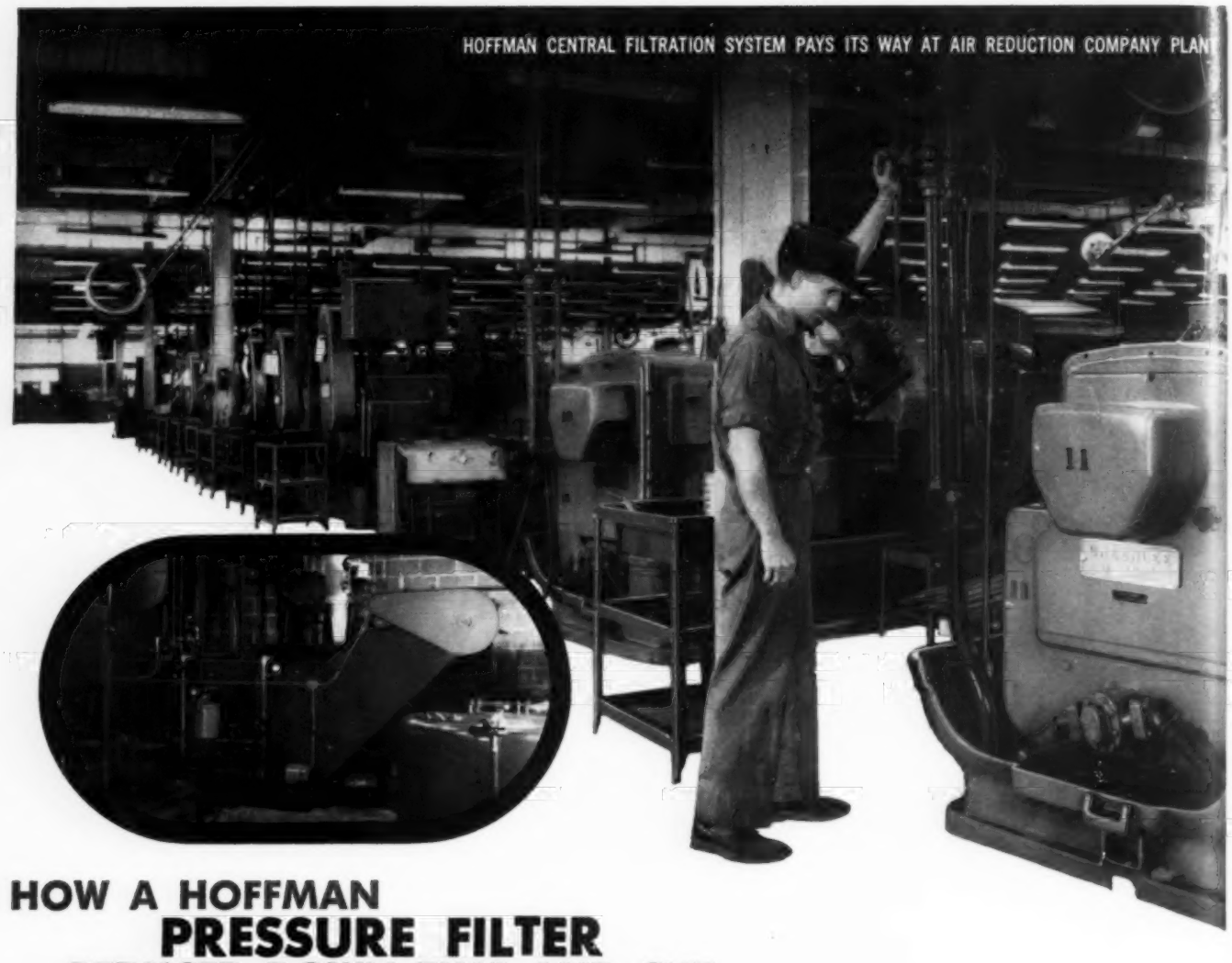
NORTON COMPANY, General Offices, Worcester 6, Massachusetts.

NORTON
ABRASIVES

Making better products . . . to make your products better



HOW A HOFFMAN PRESSURE FILTER REDUCED DOWN TIME AND CUT WELDING EQUIPMENT MANUFACTURING COSTS

before ← → **after**

the installation of a U. S. Hoffman Central coolant system servicing 30 **AUTOMATIC SCREW MACHINES,** these were among filtration problems at the Equipment Mfg. Plant of the Air Reduction Co.

1 — Each of the frequent machine changeovers with complete sump clean up required one hour.

2 — With each changeover, cutting and lubricating oil was completely discarded.

3 — Down time reduced production.

4 — Cost of servicing and maintaining machines and equipment was high.

Hoffman centralized coolant filtration was installed, these time, labor, and money saving accomplishments were noted:

1 — Changeover time and complete sump clean up has been reduced to twenty minutes.

2 — During each changeover, 80 to 90 gallons of oil is removed by ejector and recovered.

3 — Reduced down time increased production.

4 — Savings in maintenance and oil recovery rapidly paid for cost of equipment.

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Ask your Hoffman representative to analyze your filtration problems or write for Bulletin FB100 for further information.

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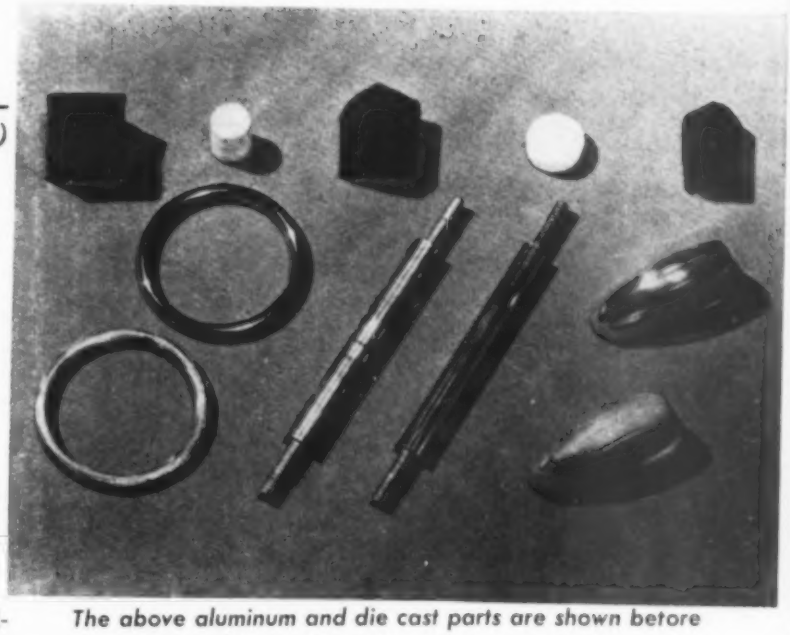
Hard felt wears well,
cuts fast in wet tumbling.

Water level 4-5 inches below
top of load.

Cob dust produces smooth finishes.



The above aluminum and die cast parts are shown before and after tumbling with a felt cut-down operation and a polishing operation with treated cob dust. The felt shown at the top of the picture illustrates some of the sizes and shapes which are available.

of media which will cushion the parts, so that a standard tumbling machine can be used. Borrowing a procedure employed in tumbling plastic, hard felt can be substituted for any of the hard media such as aluminum oxide chips. An aluminum oxide grit is added to the water with a detergent compound. The felt absorbs the abrasive and deburrs or deflashes. Aluminum oxide is suitable for steel and stainless steel, but is, however, too hard for the softer metals. A softer abrasive such as pumice is good when aluminum and zinc items are being deburred.

Hard Felt Required

Hard felt can be purchased in regular sizes and shapes. Only hard felt should be bought as the soft felt wears extremely fast. The hard felt will also cut faster because of its higher density. Felt has another advantage besides its lightness and ability to absorb abrasives. Felt is chemically inert and will not affect the ph factor of the water.

Water Level Critical

The water level in a barrel is always important. When using felt, however, it is more critical. The ability of felt to absorb water makes a break-in run necessary with water, abrasive and compound. Once this has been done, a definite water level can be established with the parts in the barrel. A water level of 4 to 5 inches below the top of the load achieves the best results. The desirable sliding action cannot be obtained if too little water is put in the barrel and too much water will cause some flotation.

An abrasive or detergent compound is recommended for runs with felt. A compound which creates a large quantity of suds should not be used because it will suspend the felt. Other than this consideration, any standard compound which is used with other media is proper. Barrel finishing with felt does have its drawbacks. Runs are generally longer and at present it is not possible to produce a polished finish.

Dry Tumbling for Polished Surfaces

When a polished surface is necessary for a fragile item, we turn to dry tumbling. Dry tumbling is more common in the plastic field than wet methods. A simple procedure for polishing without liquids, is to use cob dust which has been treated with polishing agents. The polishing cream manufacture by H. W. Kramer Co., Inc. for plastics will produce a high finish on metals. The abrasive, however, is changed to meet the demands of a tougher material. As is the case with felt, tumbling with cob dust is slower than finishing with the harder medias. However, we have found that the surface results can be far superior. Very high and smooth finishes are obtained without surface blemishes.

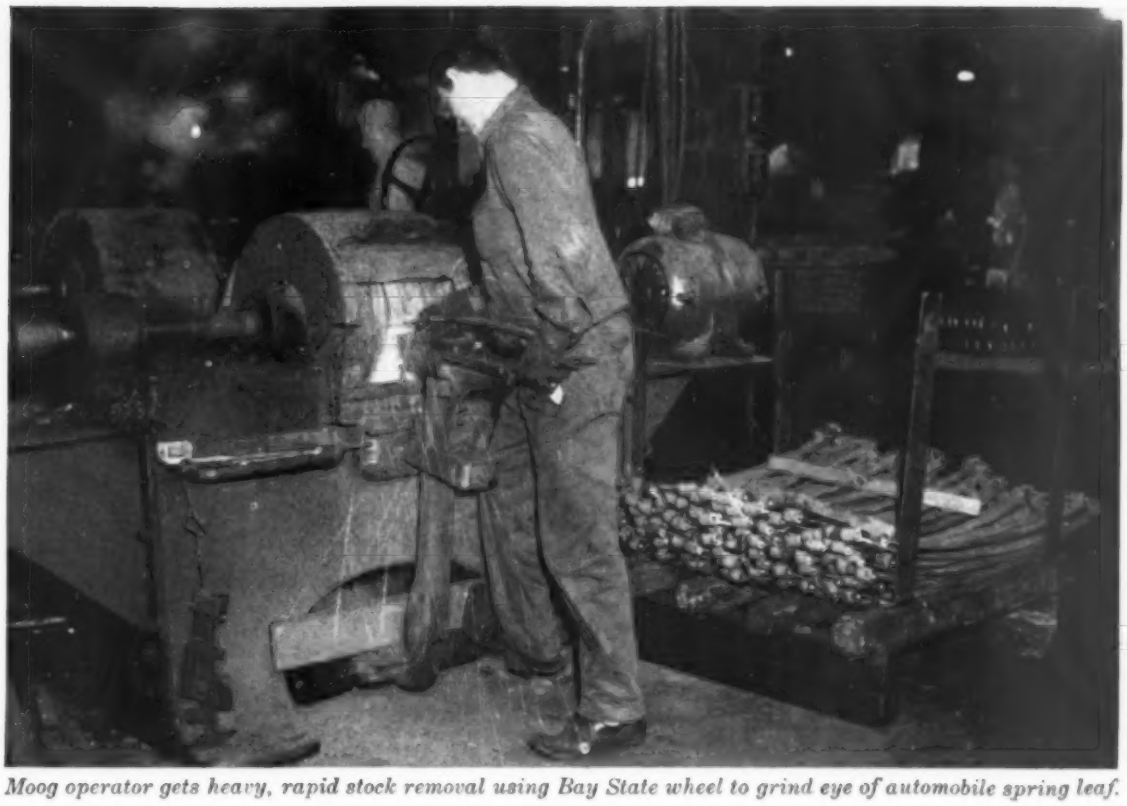
The combination of felt and cob dust give results which at times equal buffed finishes. Like all tumbling procedures, it does fill a particular need and is not the answer to every finishing problem.

The two systems outlined above are merely hints of what can be done in a standard finishing barrel. With the many materials available today, both man made and natural, particular finishing problems can be solved in some instances with a standard barrel finisher. The new types of machines, such as units with vibrating or reciprocating motions have a definite place in the finishing field, but a little ingenuity can save a lot of money for the small manufacturer, or even the large manufacturer who has short production runs.

• • •

How Warren Pouyer cut grinding co

Six years as a tool and die maker gave Bay State's Warren Pouyer a basic knowledge of precise metal working problems that many an "expert" would envy. For the last nine years, he has specialized in abrasives and has gained a tremendously wide knowledge of grinding methods and materials.



Moog operator gets heavy, rapid stock removal using Bay State wheel to grind eye of automobile spring leaf.

costs 1/3 at Moog Industries

Too many wheels were being used up too fast. That was the basic problem in the spring eye grinding operation at Moog Industries, St. Louis, Mo. A leading manufacturer of truck, trailer and automobile springs, Moog makes a complete line of front-end, chassis parts . . . and in this highly competitive business, keeping grinding costs down is vitally important.

So they called in Warren Pouyer of Bay State distributor Mill Supply & Machinery Company and he spotted the trouble right off the bat: disc grinding wheels of a specification that looked as if it *ought* to be right but wasn't. Pouyer specified the proper Bay State wheel using a semi-friable type of aluminum oxide with a unique combination of grit sizes. Production increased 33% per wheel without loss of operation speed.

Since then, the Bay State wheel has been competitively tested over and over again and it has come out on top every time . . . a tribute to Warren Pouyer's ability to specify exactly the right wheel, in this case the first time, and to Bay State's ability to reproduce a given spec *exactly* and *consistently*.

Warren Pouyer doesn't solve all his grinding problems as quickly as this. Like all Bay State representatives, he's trained to study every problem *thoroughly*. And whether a particular problem has a simple solution or a tricky one, you can be sure *your* Bay State man will stick to it until he works out a practical, economical answer. *Better grinding at lower cost—that is his business.*

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
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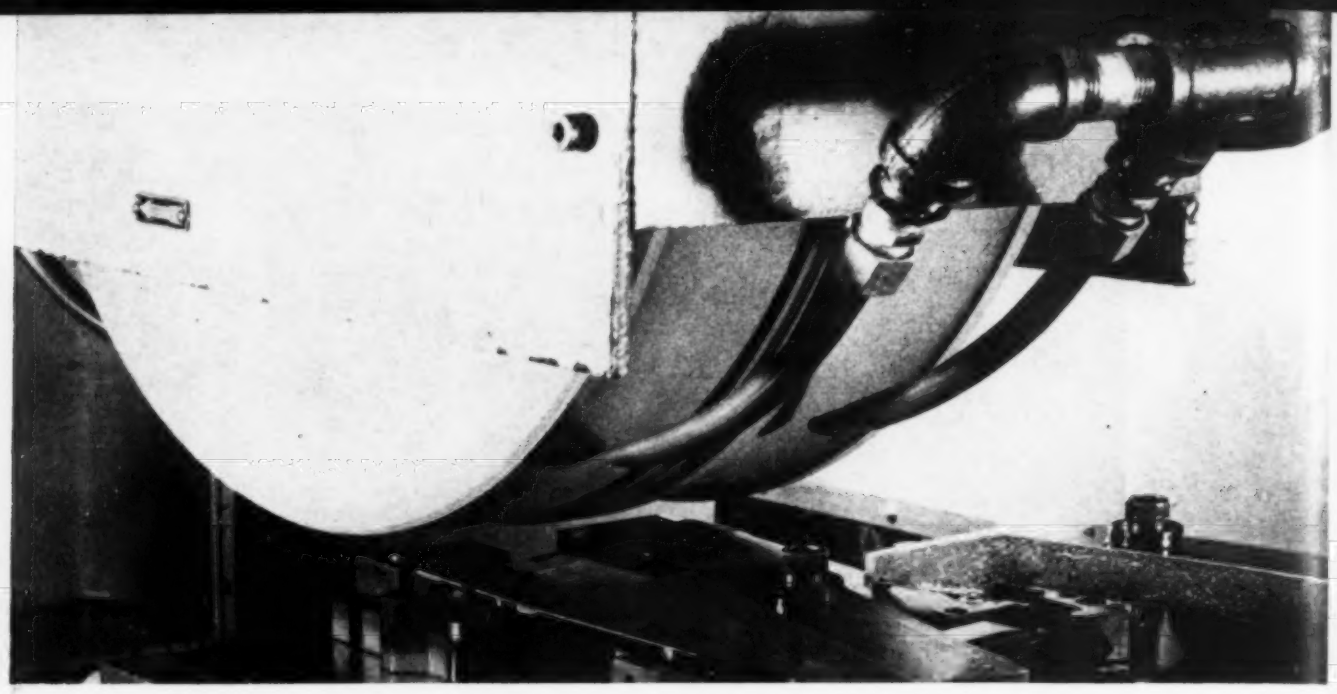
For information about any advertised product, see the Advertisers Index and Action Card inside back cover



Air foil lugs ground two at a time, with double wheel.

Single Diamond Dresses Double Wheel

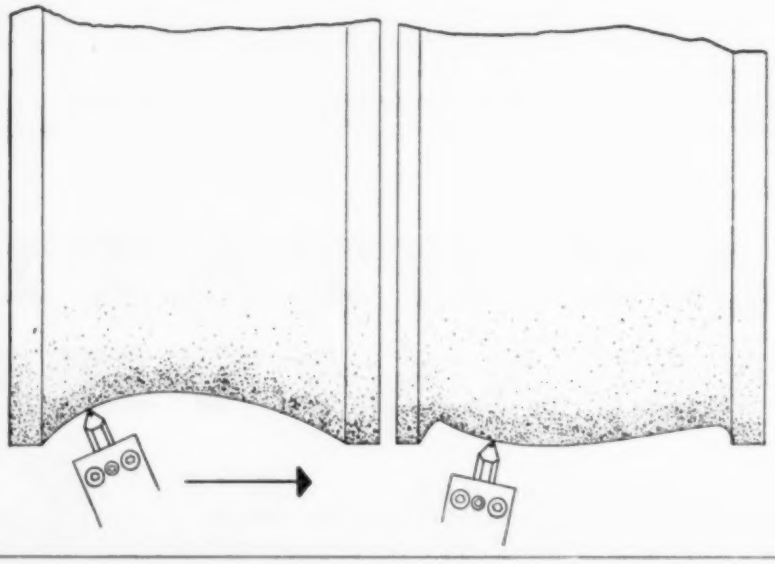
● Airfoil lugs on jet engine blades can now be contour-ground two at a time to .0002", with only one diamond used to dress the double wheel.

This job is now being performed at Thompson Products' Jet Division in Cleveland. Here, a 41-machine grinding department is producing seven blade sizes for the Pratt & Whitney J-7S engine.

The single-diamond technique is said to be the latest in wheel dressing of complex contours and double wheels, succeeding the conventional two-diamond method. The unit was developed by Hoglund Engineering & Manufacturing Co. and is installed on a Thompson Model C surface grinder.

Key to dressing accuracy is cam-control of the diamond so that its point remains normal to the wheel face during the dressing cycle. After about 50 air foil lugs are ground, the dresser moves into position under the double wheel. The diamond starts its dressing cycle at the left-hand corner and proceeds to the right-hand corner. As it traverses the wheel face, the diamond is pivoted about its own point so that it is always at a right angle to the face.

Inside the dresser is a hydraulically-powered slide. The slide mounts two templates: a contour template to control diamond movement in and out of the wheel during traverse; an angular position template to rotate the diamond. Action of a follower on the contour template is reduced to diamond movement through a 10:1 inclined plane cam. This assures the .0002" repeat accuracy which would be impractical to obtain through normal pantograph linkages. A follower on the angular position template transmits motion to a rack and pinion assembly which simultaneously rotates the diamond. • • •



Cam action in dresser causes diamond to rotate about its own point during traverse across wheel, thus enabling diamond to remain normal to wheel surface at all times.

ANNOUNCEMENT
The Congo fields which produce crushing boart have increased their production considerably this year to meet the full demand of all world markets. The reserves are estimated at current rate of consumption to be sufficient to meet all requirements for at least the next half century.
This relief from the shortage of past years means that either fragmented boart or special graded mesh sizes will be available to American manufacturers of diamond grinding wheels, cutting discs and other tools.
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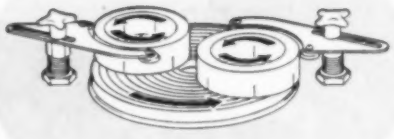

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New Inhibitor Extends Emulsion Life

• A bacterial inhibitor that will extend the life of soluble oil emulsions two to four times or more was announced to the metal working industry recently.

Called Elcide 75, the product is a development of the applications research department of the Lilly Research Laboratories. The Agricultural and Industrial Products Division of Eli Lilly and Company, Indianapolis, Indiana, is the distributor.

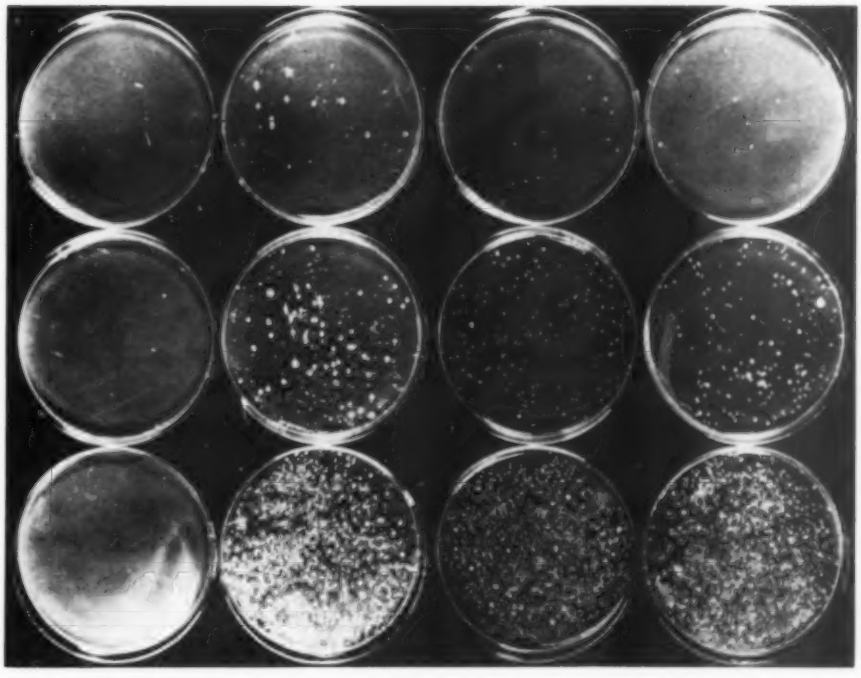
G. L. Varnes, the division's executive director, said today that "on the basis of shop evaluations we have completed, it looks like this new bacterial inhibitor will be an important factor in helping the metal working industry hold down costs of cutting oils and emulsions."

Contamination Serious

The bacterial contamination problem in emulsions used in metal working processes is often more serious than recognized. A wide variety of bacteria, especially gram-negative bacteria, thrive on oil-water emulsions and multiply at a fantastic rate. Bacterial counts approaching 1 billion per ml. have been reported in soluble oil emulsions.

Under these conditions slimes and sludges form to interfere with machine operation, and prolonged use of contaminated emulsions leads to acid formation, rusting, and corrosion. Emulsions may develop offensive odors and break down completely. Certain bacteria causing emulsion spoilage are also pathogenic and a definite industrial health hazard.

In researching the problem of bacterial inhibition, Dr. Shepard and his staff found that through biological mutation certain bacteria developed immunity to single bactericides in several days. When several inhibitors were combined, however, immunity did not develop or was postponed. Out of these findings came the product Elcide 75, a combination of thimerosal and sodium-o-phenylphenate.



The effectiveness of inhibiting bacterial growth in soluble oil emulsions is illustrated above. The plate counts were taken after four weeks under machine shop conditions. Emulsions contained, left to right, the recommended level of Elcide 75, the usually recommended level of product X (a commonly used inhibitor), twice the usually recommended level of product X and no inhibitor. Emulsion dilutions range from most dilute (top) to least dilute (bottom).

Elcide 75 is effective in all standard duty soluble oil emulsions. Observations during shop tests indicate that adding Elcide 75 to these emulsions does not alter their operating efficiency. Preliminary studies indicate that it is also effective in protecting synthetic coolants.

Lab and Shop Evaluations

Both laboratory and shop evaluations have indicated the effectiveness, stability, and safety of Elcide 75. In one shop evaluation, Elcide 75 was added to a number of grinders filled with a 40:1 emulsion. These machines were not cleaned prior to filling with the new emulsion.

The emulsion in these machines was in use for 22 weeks without separation or odor formation. The same emulsion in a control machine without the inhibitor had to be replaced at four weeks.

In another shop evaluation, conducted in a plant of a large manufacturing firm, Elcide 75 was added to existing emulsions in over 1,000 machines just before shut down for inventory. The usual routine has been to replace all emulsion in these machines following this close down. However, when the plant reopened twelve days later, only two machines needed new emulsion because of rancidity.

Under normal operating conditions, these machines have had to be recharged with new emulsion at the rate of 30 to 35 per day. According to plant authorities, the rate of change is only 10 to 12 daily with the use of Elcide 75, even when added to old emulsions. Additional shop evaluations are continuing in a plant of Allison Division of General Motors Corporation in Indianapolis, and in other plants under varying conditions.

• • •

Automatic Grinder Control to Millionths

Higher production rates.
Increased quality.
Reduction of rejects.
Longer wheel life.

● Exact measurement of bed movement and not time intervals is used to obtain uniform parts within tolerances of .0001". The RCA control system on the new Royal Master TG-12 Centerless Grinder provides higher production rates with increased quality, reduction of rejects, and longer wheel life.

The two functions of the RCA Grinder Control are to gage the ground parts as they leave the grinder and to automatically compensate for change in diameter by advancing the grinder bed. The system's gaging function accepts those parts within the tolerances set and segregates the rejects. The gaging also calls for correction whenever a series of several out-of-limit parts are detected. The second function provides exact measurement of bed movement electronically in millionths of an inch, whether the increment of correction is .00005" or .002". The inertia is overcome by a solenoid resonator which permits bed movement within desired limits.

RCA controls on a Royal Master TG-12 controls size to millionths.

Ideal for long and short runs where high accuracy is required, the RCA controls require no modification of the grinder, and in no way limits its capacity. It is possible to operate the unit automatically or manually as desired merely by pressing a button on the control panel. Adjusting the system for changes in size and tolerances requires less than three minutes.

GENERAL DESCRIPTION AND OPERATION

Parts are automatically gaged as they leave the grinder, and segregated if out of limit, in which case a size signal is fed to the limit controls which actuate compensating devices. As part sizes increase because of wheel wear, the voltage signal received increases until it reaches a preset high-acceptance point at which the bed in-feed actuator is set in motion. This movement is controlled by a bed gage which automatically stops the advance when compensation has been made, and resets itself for another correction cycle.

PARTS GAGE

The parts gage is mounted to the grinder in-feed bed. After initial centering the gage fixture need only be adjusted when the work blade is reset or replaced to accommodate another part size. Opposing air jets are usually employed in the gaging device because they are not affected by grinder dust or coolant spray, nor by dirt accumulation on the "V" track. A special diaphragm provides accurate and very reliable transmission of the air pressure to mechanical deflection which is picked up by an RCA gage head and converted into electronic signals. These govern the control's correction devices.

The parts gage fixture has hardened "V's" which are easily replaced for various groups of outside diameters. Standard range is from 1" to 2" but larger sizes can be obtained. The air jets have adjustments for accurate centering on the parts being gaged.

ELECTRONIC COMPONENTS AND CONTROLS

In addition to Thyratron circuits whose limits are preset to establish sizes and correction limits, RCA

provides other features which increase the effectiveness of this control. Typical is the parts motion detector which permits the equipment to call for correction only when parts are moving through the grinder. This prevents over-compensation. Trend discrimination is another function provided in this RCA equipment—it may prevent a single off-limit part from creating an unwarranted correction. The control can be set by the user in accordance with his own requirements. Replacement of electronic components is simplified since all are of modular, plug-in design.

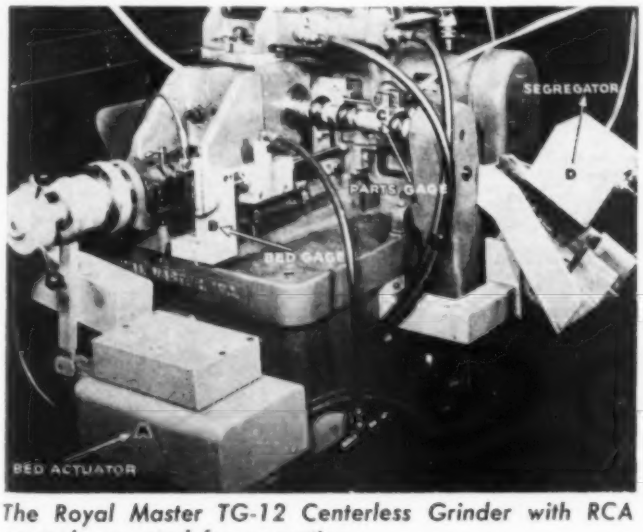
GRINDER BED CONTROL

An RCA hydro-pneumatic unit advances the grinder bed as required. This is attached to a pivot arm which advances the lead screw, but is free at all times except when correction is called for. During periods of compensation, an air piston clamps the arm to the wheel hub until correction has been made and then permits it to disengage.

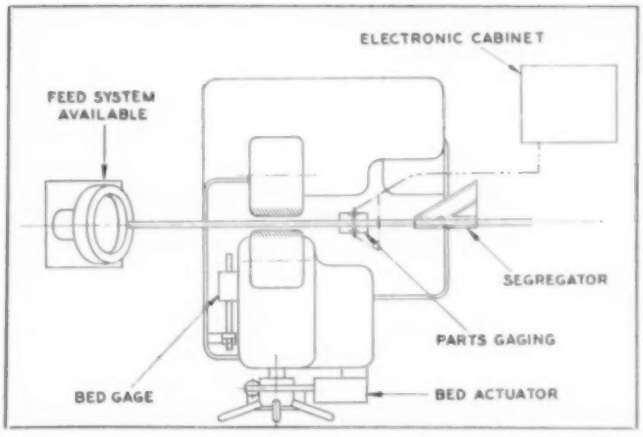
Where taper is a problem, the gages will watch the taper of the parts as they go by and indicate the degree of taper being achieved.

Users report that grinder wheel life is increased because of the gentle in-feed maintained by the control rather than the sudden excessive in-feed action which is so damaging to wheel life. With slight modifications, this RCA control system is applicable to all types of centerless grinders and is currently being used on No. 2 Cincinnati and Landis Centerless Grinders. It requires no modification of the grinder other than drilling holes for mounting and, even after installation, permits both automatic and manual operation. It in no way limits the capacity of the unit to which it is applied. Accessory RCA equipment includes a complete line of hoppers and elevators, as well as surface flaw detection, high speed hardness testing and assembly devices.

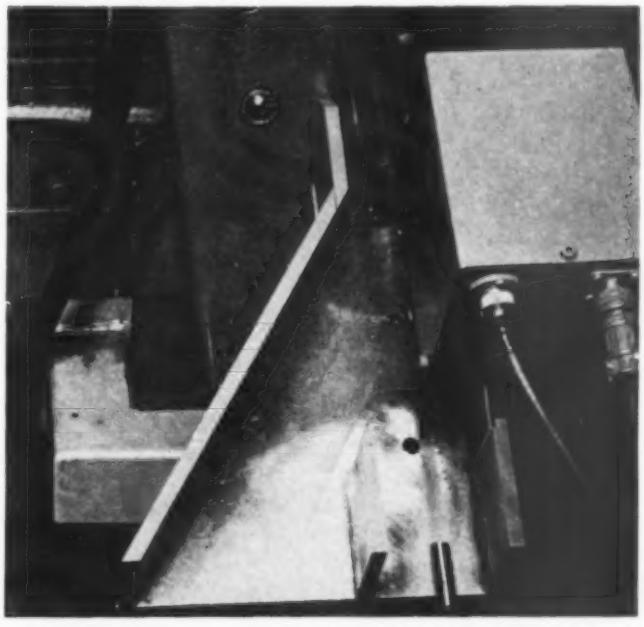
The control eliminates the need of spot-checking parts and of adjusting the grinder during production runs. In many cases it can increase output by as much as 200 to 300%. Where present procedures require three or more successive steps, the RCA grinder control will eliminate one or more intermediate operations. • • •



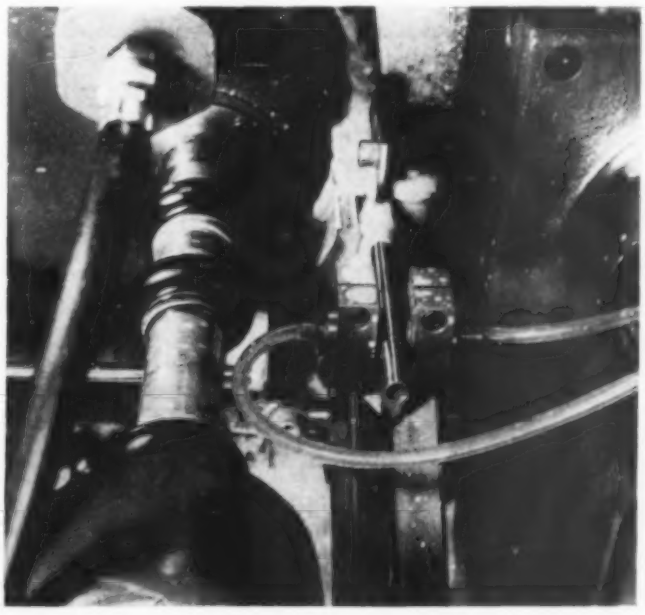
The Royal Master TG-12 Centerless Grinder with RCA controls mounted for operation.



Schematic of the location of RCA controls on a centerless grinder.



Close-up of parts segregator with finished part leaving.



Shown here is the part passing through the gaging device.

By **Albert H. Carr**
Grinding Engineer
Norton Company

● In the field of electronics, the big word is germanium. Tiny transistors and diodes made from this material are replacing vacuum tubes in many applications. The result is small compact units of increased dependability.

The wafers of germanium, and also of silicon, which form the heart of these semiconductor devices, are made entirely with abrasives. Diamond wheels slice the germanium from the ingot and later dice the wafers into pellets or "dice". Diamond wheels or loose silicon carbide are used to surface grind or lap the wafers to final thickness.

The unique problem in the cutting and grinding of germanium is the high cost of the material. Germanium costs from $300 to $600 a pound. In cutting this very hard, very brittle metal, the diamond wheels selected are as thin as possible to minimize the loss of material in making the cut.

Another problem in making the germanium wafers is that, though they are very small, the faces must be parallel. In the initial slicing, it is important to cut them as nearly parallel as possible to eliminate any unnecessary surface grinding or lapping in later stages. Parallelism between opposing faces of the wafers must often be held within .0002".

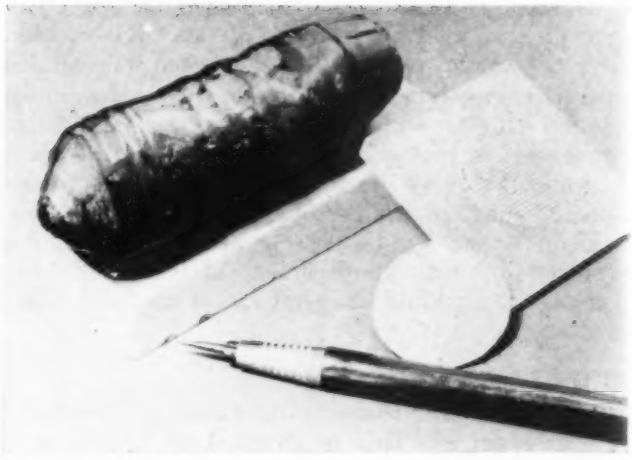
Free Cutting Wheel Required

In cutting the ingot to form wafers, a very free cutting wheel is required because of the irregular surface, which is something like that of an icicle. The ingot is rarely cylindrically ground to present a straight surface to the cut-off wheel, so there is a tendency for the wheel to slide one way or another in the initial cut. To eliminate this tendency, the diamond wheel selected must be very free cutting.

A free cutting wheel is assured by selecting the right grain and grade specification. A typical recommendation for slicing germanium is a D220-N100M ⅛". At 5000 surface feet per minute, this wheel will cut satisfactorily at a rate of about three inches per minute. Occasionally, even more rapid speeds than this have been used.

In the slicing operation, the face of the diamond wheel must be absolutely true. These wheels are all carefully trued and dressed before they leave the factory. Dressing is important in the use of these thin cut-off wheels because this action erodes the metal bond from around the diamond particles, exposing them so that they may cut freely.

As a further aid to freer cutting, the diamond wheel is relieved, that is, the metal center of the wheel is thinner than the diamond section itself.

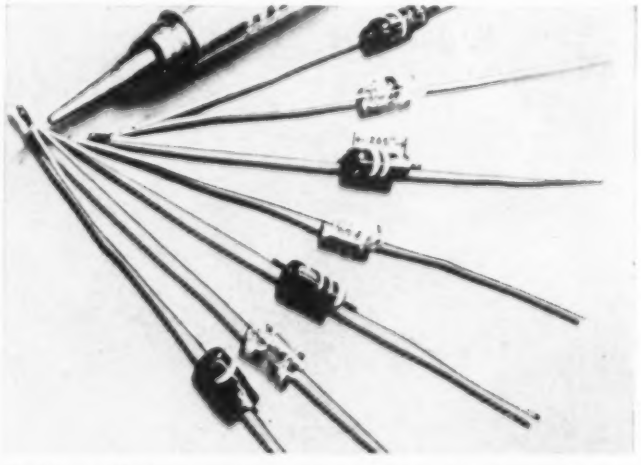


A silicon ingot and a wafer with a diced wafer mounted on glass plate. Pencil shows size comparison.

In cutting silicon, a D180-L100M ⅛" wheel is recommended. The coarser grit size is very desirable for freer cutting in this material. Feeds as high as 18" per minute have been achieved with this wheel specification.

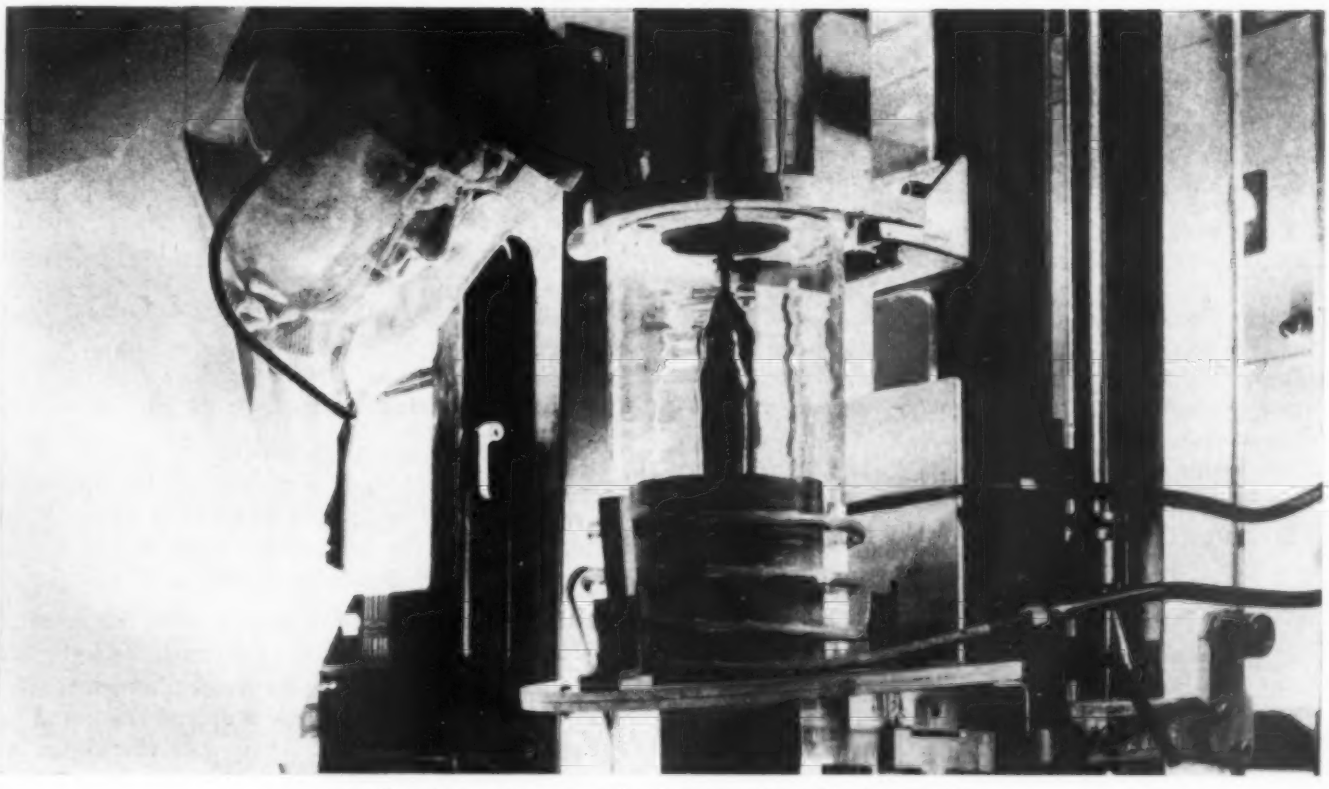
Work Feed Rate Important

In setting up a new operation, or when trying a new wheel specification, a feed of about one inch per minute is recommended. The rate of feed can be increased gradually until the optimum speed is reached. Three inches a minute is about the maximum that can be used in cutting germanium. Six to eight inches a minute is about average for silicon. Feeding at a rate higher than the optimum speed is indicated when the wafers which are cut off are no longer parallel. Forcing the wheel too fast causes the wheel to deflect to one side, making wedge shaped wafers. In extreme cases, the wafers will break off instead of being cut. Forcing the wheel into the work can have disastrous effects on the fragile and expensive wheels, too.



Finished diodes ready for installation in electronic circuits. Pencil point shows size comparison.

Diamond Wheels Cut Germanium, Silicon

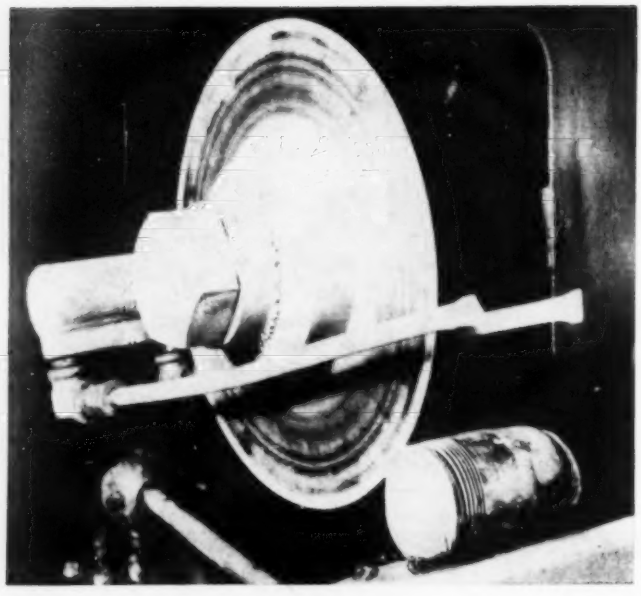


In five hours the crystal of germanium in the quartz housing grows to be about 11" long, 1½" thick, and is worth about $3,000

√ *Use very thin metal bond diamond wheels*

√ *Cut wafers parallel*

√ *Guard against edge breakage*



Slicing an ingot of silicon. Tubing on each side provides flow of coolant.

Use Single or Gang Mounted Wheels

Ingots may be sliced with single or gang mounted diamond wheels. The same wheel specification would be used in either case. Ingots to be sliced with a single wheel may be mounted in two ways. They may be mounted in a cantilever fashion or they may be cemented to a ceramic or glass block. To increase production, several ingots are usually placed in a line so that the wheel will traverse through all of them. As many as five or six ingots may be so placed.

In gang cutting, the plate would be clamped to the traversing table of the cutting machine. In one rather interesting patented process, two serrated strips of metal are pulled down to a magnetic chuck and bite into the sides of the ceramic or glass block. The ingots themselves are held to the plate by sealing wax or a cement such as Glyptal cement. The material which holds the ingot to the plate should be readily soluble.

Because of the very brittle nature of germanium and silicon, great care should be taken to prevent breakage of the wafers, particularly when they are cut off. When the wafers are cut in the cantilever method, the wafers are allowed to drop off onto a sponge. This precaution is not required with the gang slicing operation when the ingot is cemented to a block. They will still remain in a standing position because of the cement.

Coolant—Water with Inhibitor

Coolant is used in the cutting operation. Plain water with enough rust inhibitor to protect the machine is recommended. It can be applied directly at the contact point of the wheel, or by means of water flanges.

Water flanges are shaped very much like conventional flanges. They are recessed and radial slots are cut in the bearing surface of the flange to permit water to flow out through the periphery. A slot in the spindle provides the water to the interior part of the flange. It is very important that the flow of clean coolant be applied equally on both sides of the wheel to prevent any deflection of the very thin wheel. The coolant should be clean to prevent any build-up of swarf on the recessed side of the wheel. Filters or centrifuges are very important in such a set-up.

Surface Finishing

After wafers have been sliced from the ingot they are either lapped or surface ground to the desired thickness. They can be lapped using a fine silicon carbide loose abrasive in a proper oil vehicle or they can be surface ground using a fine diamond wheel. In some cases, a shellac bonded silicon carbide wheel has been used successfully. In this finishing operation, only a few thousandths of an inch of stock are removed. It is quite important that the wafers be sliced to almost the exact dimensions in the initial cutting-off operation to eliminate the wasting of material in the surface finishing later. The wafer as initially cut is usually about .010 to .018" thick. The finished wafer may be as thin as .006". Lapping or surface grinding is necessary only to bring the wafer to the desired thickness and limit of parallelism.

Etching and Dicing

The final step in the preparation of the slices before dicing is etching. This removes the disturbed layer on the surface of the pellet and cleans it to permit fastening the lead wires in the actual manufacture of the transistor or diode.

After the wafer has been lapped or surface ground and etched, it is mounted on glass or ceramic blocks and placed on the table of a special dicing machine. The wheels in this operation are gang mounted to cut the wafers into small squares or rectangles, in two successive operations. After the first cut is made, the block is turned 90° and a second cut is made. During this operation, a Type D1A1 or straight sided diamond cut-off wheel is used to cut through the wafer into the ceramic plate about 1/32 or 1/16". The resulting product is the actual pellet which is used as the transistor or diode element. These would measure .006 or .007" thick, and .020 to .040" on a side. Some of these are about the size of a pin head.

Wheel Size 3" x .006"

The wheels used for dicing differ somewhat from those used in the cutting-off operation. Since in the dicing operation, the wheel only cuts through a very thin section, no relief on the wheel is required as it is in the cutting-off operation. Dicing wheels are straight sided, about three inches in diameter and .006" thick. Some wheels may be as

thin as .004", in the more fragile 1½ and 2" diameter sizes. The 3" x .006" are the most popular size. For cutting germanium in this size, the specification would be 220-N100M ⅜" x 9. For silicon, the specification should be D180-L100M ⅜". The spacers which are used between the wheels in a dicing operation should be almost as large in diameter as the smallest diameter of the diamond section, to give as much support as possible. The spacers should be surface ground and lapped so that the surfaces are completely parallel and perpendicular to the axis of the wheels. As many as 40 to 60 wheels might be mounted on the spindle for the dicing operation. The thickness of the peripheral diamond section of wheels used for dicing are held to very close limits. The difference would never exceed .001".

In dicing, the same type of coolant is used as in cutting-off. The coolant, of course, should be filtered. A rust inhibitor should be used, too.

Dicing is always done with gang mounted wheels rather than by means of a single wheel. Gang slicing saves considerably on production time. The same type of cement or sealing wax is used to fasten the wafers to the ceramic or glass block.

Great care must be taken in the handling of these very thin wheels in setting up for cutting in a gang operation. They can be easily bent or chipped and it should be remembered that these wheels will be operating at about 5000 sfpm. These wheels are only twice the thickness of a human hair and are extremely fragile. If dropped, they certainly should not be run on a machine until they have been thoroughly checked by a competent person. A chipped wheel used in a dicing operation could ruin the work. If a wheel is found to be chipped, the surface imperfection can be removed with a brake controlled truing device and then the wheel should be dressed with a proper dressing stick.

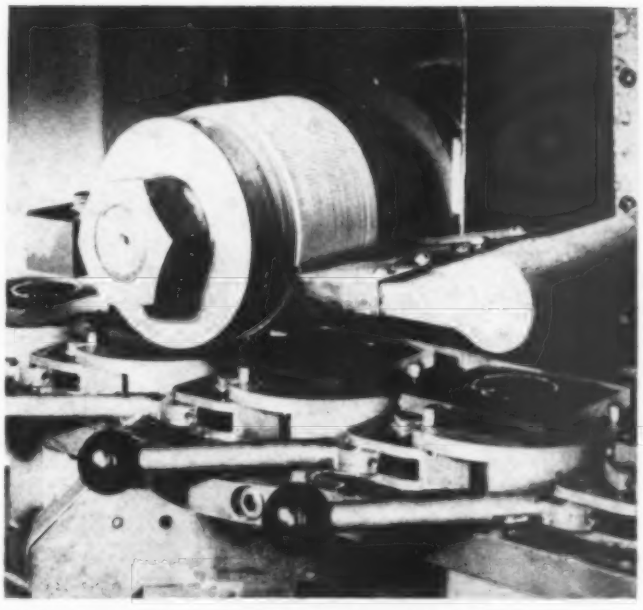
The wheels would not be trued when set up in a gang fashion. The truing operation should be done on another machine at as low a speed as possible. For this operation, soft grade silicon carbide wheel of relatively fine grit size is recommended. The best results are obtained by truing one wheel at a time.

Whenever the operation indicates that the wheel is not free cutting, a dressing stick, 37C320-HV, can be applied to the face, though it is necessary to be careful not to bend the wheel while it is revolving at the 5000 sfpm. To prevent damage to the wheels, it is recommended that a series of parallel cuts be made in the end of the dressing stick to a depth not exceeding 1/16".

These are the points to watch most closely.

1. Operate the diamond wheels at 5000 to 6000 surface feet per minute. At higher speeds, there is a tendency for the wheel to load or "walk" in the cut.

2. Determine the total depth of cut in the slicing operation and select diamond wheels and flanges of correct size to assure adequate clearance between the work and the flanges at full depth of cut.



Dicing operating on silicon wafers. Note gang mounting of diamond cut-off wheels. After being cut in one direction, the ceramic blocks are turned 90° and a second series of cuts is made.

3. Use judgment and caution in selecting the thickness of wheel. The thinnest possible wheel will result in less waste of expensive material. However, wheels which are too thin are apt to bend under even normal grinding pressure causing rejected work.

4. Select your diamond wheels from the list of wheels made by the manufacturer to special blueprint dimensions especially for this operation. These wheels are made to exceptionally close dimensional tolerances.

5. Use proper wheel truing and dressing techniques to keep the cutting operations trouble-free. The Norton brake-controlled truing device with a 37C80-I5V wheel has proved to be one of the most effective tools for this operation. Use a silicon carbide dressing stick to "sharpen" the wheel face after truing.

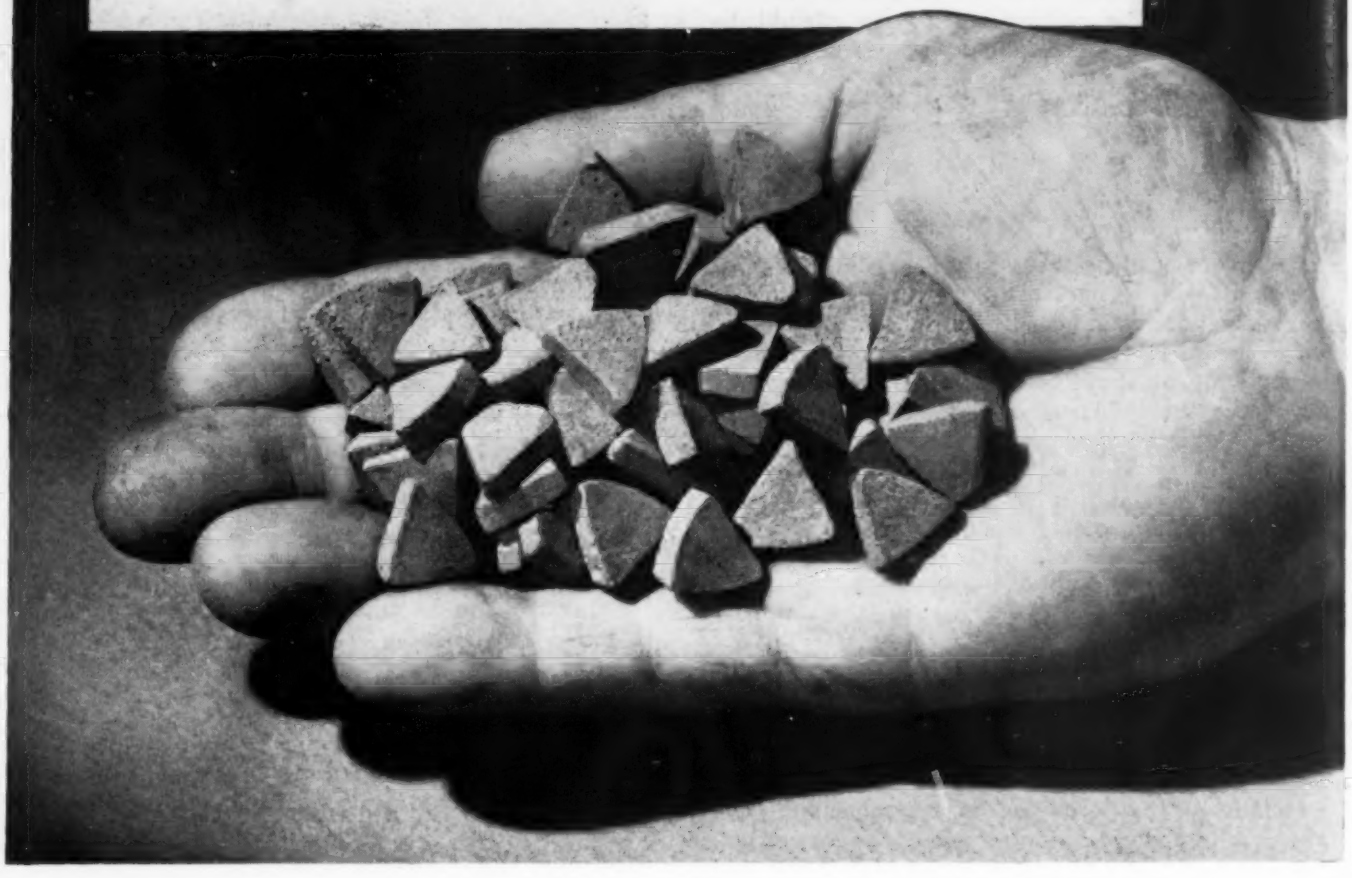
6. Always use a full flow of sludge-free coolant on the diamond wheels to keep them clean and fast cutting. Water with a rust inhibitor or a dilute mixture of water and soluble oil should be carefully directed to the face on both sides of the wheels. Equal force on each side will prevent deflection of the wheel. Do not use enough pressure to wash the pellets from their mountings.

7. Save your germanium grinding swarf. The germanium recovered can be salvaged for reuse. Silicon, which is not so expensive, is normally not reclaimed. • • •

(Photographs courtesy of Hughes Aircraft Company)

Leading deburring company writes in:

To us, TUMBLEX* "T" abrasive is literally a "Touch of Gold"



Describing one of the revolutionary Norton barrel finishing abrasives, this customer continues:

We formerly were stocking four types of finishing media. By switching to ALUNDUM TUMBLEX *"T" abrasive we have eliminated three types and are getting better results. For example, one particular metal part required six hand operations prior to barrel finishing. Now, with your abrasive triangles, barrel finishing is all that's needed.*

Made of bonded ALUNDUM* abrasive, TUMBLEX "T" has a triangular, non-wedging shape that's excellent for finishing intricate-shaped parts . . . provides long, even wear . . . assures fine, uniform finish, short time cycles and big savings in finishing costs.

Other Norton top-performing barrel finishing abrasives include ALUNDUM TUMBLEX "A" abrasive, for general usage; ALUNDUM TUMBLEX "S" abrasive spheres that get into hard-to-reach areas; and TUMBLEX "N" abrasive, natural stones for producing highest lustre on various parts.

Send samples of parts, any sizes or shapes, to our Sample Processing Department. We'll barrel finish, return samples and report the methods and abrasives you need. Or, when you're in this area, come in and look things over, personally.

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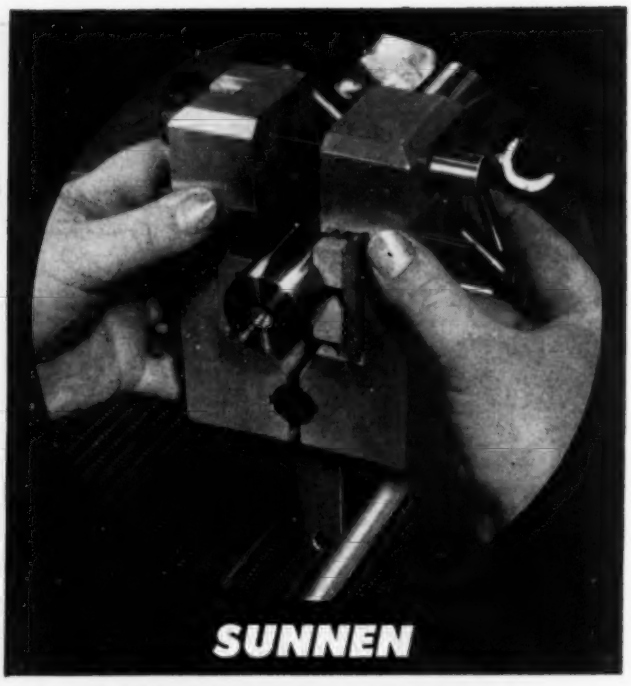

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Hopper Feed Speeds Small Parts Grinding

An unusual twist has resulted from the advent of crushed wheel grinding in the past decade. Prior to this development, the problem was always production rate of the grinding operation itself. Now, the shoe is on the other foot; process engineers are hard-pressed to develop feeding techniques which can match the high productive rates of crushed wheel grinding.

One such feeding technique has been devised by the Saginaw Steering Division of General Motors Corp. for increasing the grinding rate of power steering pump vanes. By semi-automatically feeding the pump vanes onto magnetic chucks, optimum output from the grinders has been achieved. Before the new system was devised, 264 vanes were individually placed on magnetic chucks by hand. Each machine operator loaded his own chucks. With the new semi-automatic loading, the production rate with two Thompson Truforming grinders shows better than 400 percent productivity improvement. Two men work with the pair of machines, one loading chucks and the other operating the grinders.

The new system uses a rotating hopper to align and group the vanes automatically. Then, the vanes are taken from the hopper assembly in rows of 22 vanes and transmitted to the magnetic chuck. Twelve rows, 264 vanes, constitute a full chuck load.

Grinding time for one full load of vanes is approximately 2½ minutes. Each vane is ground on one side with a single radius which must be square with the

Rotating hopper aligns hydraulic pump vanes and loads them into a gravity-feed chute. The vanes are taken from the chute in groups by the operator who transfers the vanes to the magnetic chuck in rows of 22 vanes each. When the chuck is loaded with 12 rows, it is placed on one of two Thompson Truforming grinders.

end of the vane within 0.00015 inch. After every seven loads, or complete grinding cycles, the grinding wheel is crush formed.

Manufactured by Detroit Power Screwdriver Co., the hopper is a standard rotating unit which drops the vanes into a rectangular loading chute. The chute is inclined at a slight angle for gravity-feeding.

A spring-loaded dog at the chute end holds the vanes in place. The operator then places an L-shaped loading track at the end of the chute; the track displaces the dog and 22 vanes fill the track. The hopper is designed to fill the chute at the rate of 250 to 300 vanes per minute.

After the loading track is filled, the operator tips the track over on the chuck so that the vanes drop into place on the chuck. They are separated by brass spacers which help concentrate magnetic flux of the chuck within the vanes to increase holding power. The chuck holding the vanes is then in turn held to the work table of the grinder with a magnetic chuck.

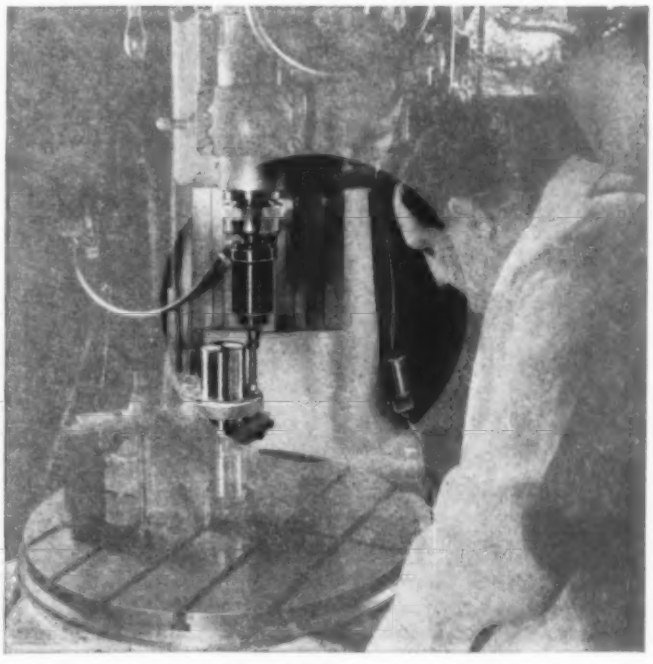
• • •

Hopper feeding and crush form grinding increased the production of hydraulic pump vanes 400 percent. Two men handle the operation; one loads the chucks while the other loads and runs the machines.

HOLES

JIG GROUND with

Vulcanaire



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MATTISON
HIGH-POWERED PRECISION
GRINDING METHODS

Machining competitively priced parts?

Consider the unexplored opportunities to save with special, multiple-operation grinders!

EXAMPLE: This 4-station Mattison "special" has three work stations, plus a load and unload station, for completely automatic grinding of head bearing sections for rock bits. The workpiece never "waits" between operations. Investment in a highly automatic special machine is long-range assurance against obsolescence and competitive disadvantage.

If your parts are competitively priced, perhaps you can save a great deal of time, floor space, and cost by combining a variety of grinding operations into a package.

An example is this special four-station Mattison grinder for rough- and finish-grinding the head bearing sections of rock bits. The work package consists of: surface-grinding the top of the bearing pin, rough-grinding the pin diameter and adjacent shoulder, chamfering the pin, and finish-grinding the pin diameter and shoulder.

Size is controlled automatically by gages which reset the grinding wheels to compensate for wheel wear. The entire machine cycle is automatically controlled. The operator's console is equipped with indicator lights that provide a visual record of work status.

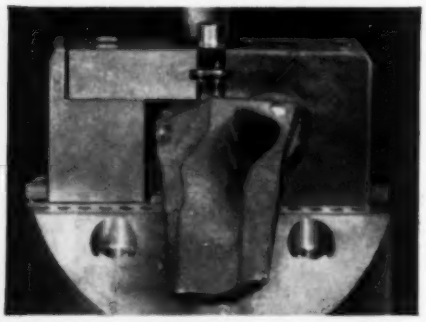


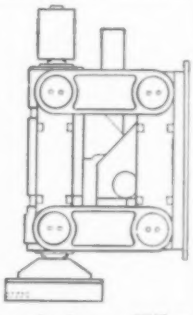
Fig. 1—This adjustable workholding fixture is easily adapted to a variety of pin sizes, from 3½ in. to 9⅞ in. Work shown is in the load-unload station.

Despite the fact that this is a high-production machine, it has considerable flexibility and can handle parts for bits ranging from 3½ in. to 9⅞ in. sizes. Adjustable fixtures (Fig. 1) adapt the grinder to a relatively wide range of work.

Parallelogram head

The Mattison patented parallelogram head is used at station No. 2. Advantages of this design include: completely sealed, preloaded bearing journals; elimination of play commonly developed in conventional tool slides; and all mechanisms completely sealed to exclude grinding dust and/or coolant.

The parallelogram head on this machine features hydraulic feed working against an adjustable lead screw stop; and both rapid approach and fine feed strokes, with controllable feed rates and adjustable limits. The lead screw features a variable increment infeed, making the head ideally suited for cycling operations and automatic size control systems.



Somewhere in the variety of cylindrical and surface grinding operations in your plant, there may be (and probably is) enough work and high volume to justify special, multiple-operation grinders. Why not investigate these opportunities and give your plant a chance to be different from, and better than, your competitors who rely on "conventional" machining methods. It won't cost you anything to find out—just pick up your phone and call:

MATTISON MACHINE WORKS
Rockford, Illinois Phone 2-5521

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HIGH-POWERED PRECISION SURFACE GRINDING

SHOP HINTS

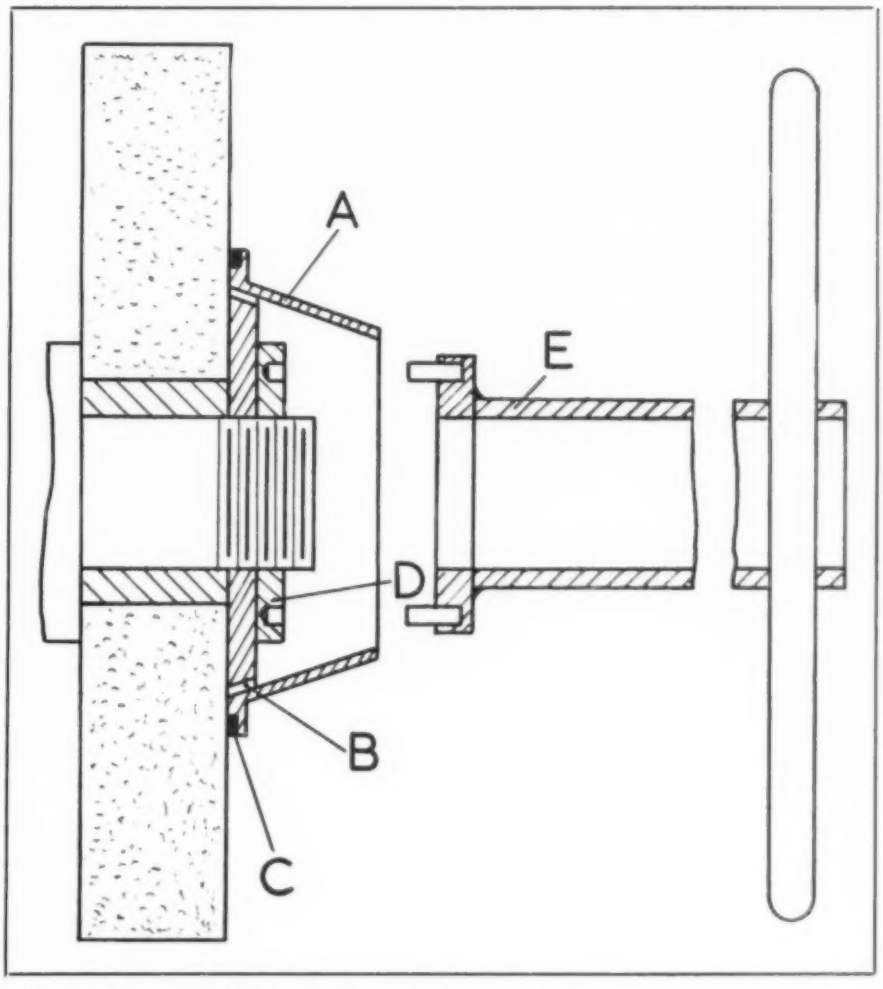
Feeding Coolant Through Lead - Bushed Wheels

By **Clifford T. Bower**

● Some proprietary makes of grinding machine, particularly surface grinders, are now fitted with a system whereby cutting lubricant is fed to the grinding wheel close to the hub so that the centrifugal force of the revolving wheel throws the coolant from the periphery in the form of a fine spray. The coolant filters through the pores of the grinding wheel structure and is finely divided.

This method of applying coolant has proved very valuable in the attainment of fine ground surface finishes and for the grinding of thin work without causing distortion. With the correct type of coolant, surface finishes of 1 microinch CLA have been obtained on hardened steel blocks, with a final cut depth of 0.0001 in. and a wheel surface speed of 26 ft. per min. Other advantages of the cooling method include increased wheel life, more pieces between wheel dressings and a reduction in the formation of fine surface cracks in the work.

Any existing surface grinder can be converted to this method of coolant application. A simple method of feeding the coolant through the hollow spindle of a surface grinder was described by the author in GRINDING AND FINISHING for July, 1955. This method is suitable for use with wheels which have no lead bushing or core.



Sketch of coolant feeding device

When wheels with lead hubs are used, the type shown in the drawing can be adopted. It comprises a turned brass cup with a cross section similar to that shown at A. The coolant feed pipe is not shown but it is inserted into the mouth of the revolving cup and coolant is flung towards the inner periphery. About 20 holes B of ⅛ in. diameter are drilled through the bottom face of the cup and equally spaced around the periphery. The coolant flows through these holes under the action of centrifugal force and into the porous structure of the grinding wheel. The coolant is prevented from being flung off by means of the rubber ring C which fits into a flange on the exterior of the cup. The blotting paper washers between the cup and the wheel are reduced in diameter so that they are smaller than the pitch circle diameter of the holes in the cup.

The normal wrench cannot be used for tightening the wheel nut D so a new wrench is made up from a piece of pipe, as at E. In use, the coolant should be of low viscosity and if it is fed from the pumped supply on the machine, it should be filtered efficiently, or

clear the air for production

Dust produced by grinding, chipping and similar operations is removed as created by down draft dust control systems, pioneered by Kirk & Blum.

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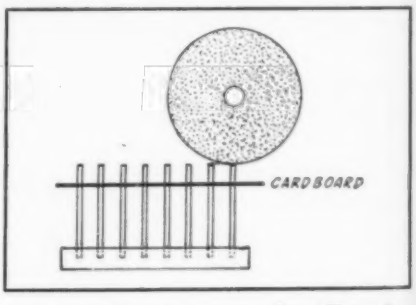
the grinding wheel will become clogged with impurities and will not pass the coolant through to the periphery. When it is desired to stop the wheel, the coolant should be turned off and the wheel allowed to revolve for a minute or so to fling out all the residual coolant. If the coolant is allowed to run through the stationary wheel, it will collect at the low side and cause serious unbalance.

Finally, an interesting fact is that a patent is said to have been granted to a Mr. W. Cavert in the year 1888 covering the principle of feeding coolant through the porous structure of a grinding wheel; only in recent times has the idea been adopted. •

Grinding the Ends of Long Pins

By **Buckley Sullivan**

● Frequently it is found necessary to grind the ends of long pins which project from press-fit holes in a piece of steel—pusher pin nests in die-casting dies or push pin nests in various forms of stamping dies, for instance. If the pins are of small diameter in relation to their length, extremely light grinding cuts are necessary in order to eliminate vibration which may break or bend the pins, or loosen them in their sockets.



A simple way to handle the grinding of such pins, which will allow conventional grinding cuts of .003″ to .005″, is to brace the pins against each other by forcing a heavy piece of cardboard over them, as illustrated. Corrugated cardboard will not work, but any solid sheet will do. Just place it over the pins and punch holes in it by tapping above each pin with a rubber or rawhide mallet. For best results, the cardboard should be as close to the top of the pins as is possible. •

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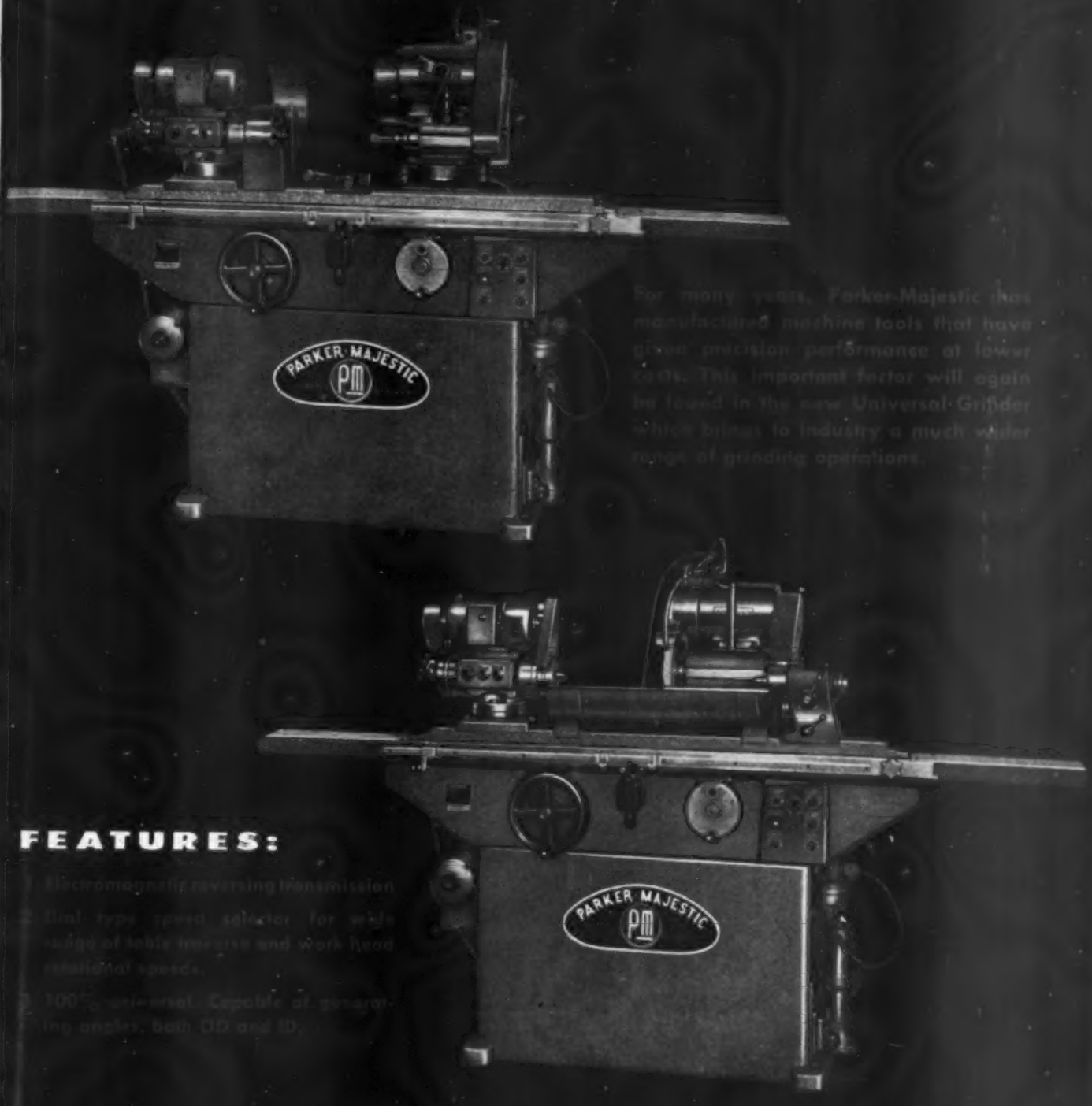

For many years, Parker-Majestic has manufactured machine tools that have given precision performance at lower costs. This important factor will again be found in the new Universal Grinder which brings to industry a much wider range of grinding operations.

FEATURES:

1. Electromagnetic reversing transmission
2. Dial type speed selector for wide range of table traverse and work head rotational speeds.
3. 100% universal. Capable of grinding angles, both OD and ID.

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Are Your Grinding Wheels OVEREXPOSED?

by **Richard L. McKee**

• Overexposure isn't just something that happens to your only snapshot of Lake Whozis . . .

Or to vacationers on their first couple of days away from the plant . . .

It happens to grinding wheels, too.

If it's a snapshot, you might be disappointed.

If you are the sunburn victim, overexposure can be painful, and could spoil your vacation. It's definitely something that you have to look out for.

But in either case the effects usually wear off in a short time. However, if you happen to be using a grinding wheel that is overexposed by inadequate or improperly adjusted guards, the results of a wheel breakage could be both painful and permanent. Every grinder operator should be familiar with the general requirements for proper wheel guarding. Everyone with greater responsibility for safety—safety engineers, design engineers and supervisors, for instance—should know in detail the provisions for safety guards in the American Standard Safety Code for *The Use, Care and Protection of Abrasive Wheels.*

The key requirement is this: The exposure above the horizontal center line of the wheel must never exceed 65°. For practical purposes, this distance is about half of the diameter of the guard above the center line, on the outside diameter.

Specifically, the maximum overall exposures are . . .

For bench and floor stand grinders, 90°, unless grinding is to be done below the horizontal plane of the spindle, when 125° is allowable.

For cylindrical grinders, 180° but no more than 65° above the horizontal center line.

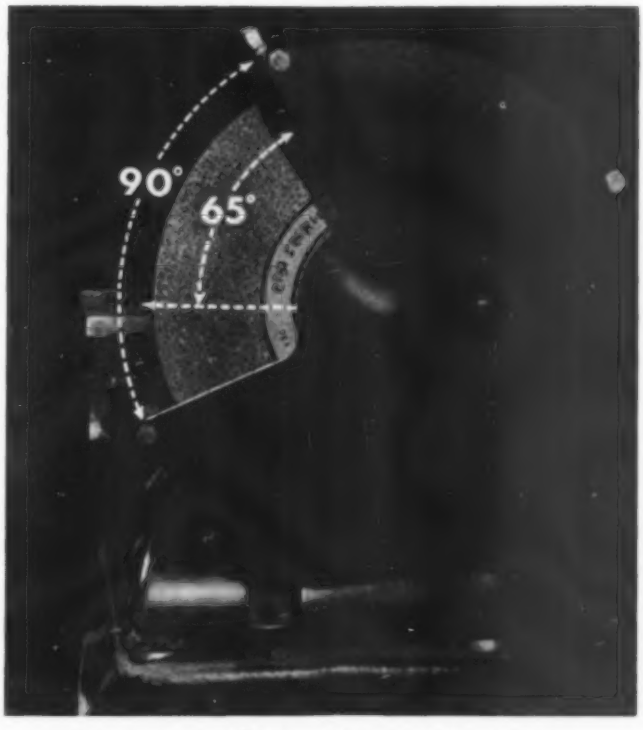
For surface grinders and cutting-off machines, 150°, with at least 15° of guard below the horizontal center line of the wheel on either side.

For swing frame or portable grinders, 180°, the lower half of the wheel. The top half of the wheel should be protected at all times.

For grinding on top of the wheel, never more than 60° exposure.

If the operator stands in front of the wheel, the distance between the adjustable tongue of the guard, if there is one, or the end of the outside rim of the guard at the top of the opening, should never be more than ¼".

Don't forget that the operator can be over-exposed, too. Safety goggles or a face shield, plus any other protective clothing required by the operation, are proper attire for him while he is operating the grinding machine. • • •



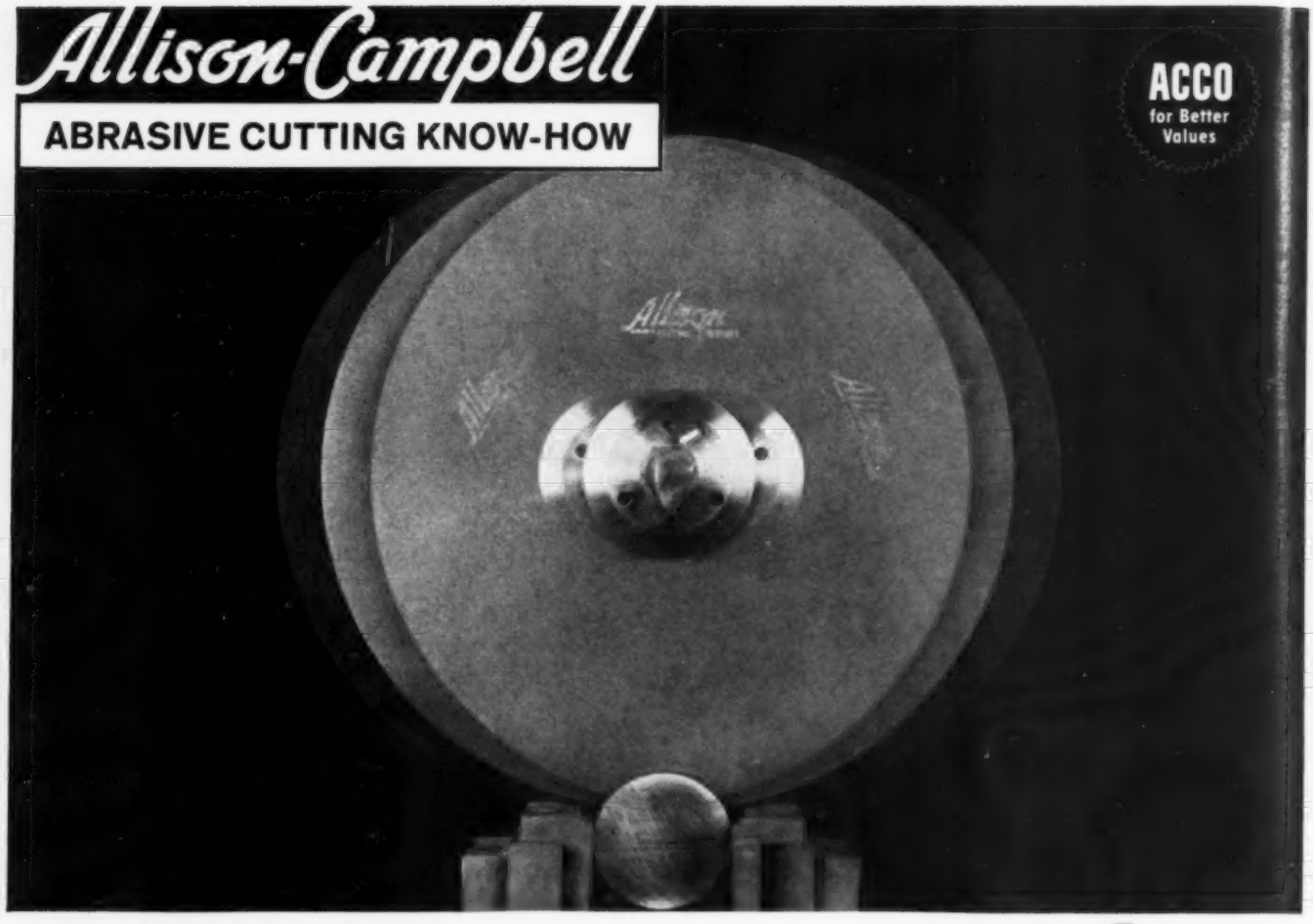
Correct exposure. 65° above horizontal center line.

A well-guarded wheel and operator.

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO for Better Values



Oscillation Improves Abrasive Cutting 4 Ways

On an oscillating-type abrasive cut-off machine, the cutting wheel is rocked back and forth *across* the cut while the wheel is fed downward. This horizontal movement produces some remarkable results.

1 **Greater cutting capacity** is one big advantage of oscillation. Because oscillation reduces the arc of contact between the wheel and the work, it is possible to cut solid steel bars up to 12″ square. Without oscillation, 2″ to 3″ would be the practicable limit.

2 **Faster cutting** is another benefit of oscillation. Because the reduced arc of contact offers less resistance to the cutting wheel on large sections, the same wheel cuts faster, straighter, and with less feed pressure. Cutting rates of 4 to 8 seconds per square inch are maintained on even the largest cross-sections.

3 **Better quality cuts** are obtained with oscillation. Less heat is generated because of the small arc of contact, and the rocking action permits coolant to enter the cut more easily and prevent any heat build-up.

Burn-free cuts are produced with negligible burr, and there is little or no need for further finishing.

4 **Longer wheel life** is an important economy factor. The lower cutting temperature resulting from oscillation adds extra cuts to the life of every wheel.

The better flow of coolant within the cut washes away metal chips and loose abrasive, helping wheel efficiency.

HOW ALLISON-CAMPBELL CAN HELP

A complete selection of machines and wheels for *any* cut-off application is offered by ALLISON-CAMPBELL. Four types of CAMPBELL machines—chop stroke, oscillating, horizontal, and rotary—in capacities from the smallest stock to 14″ rounds . . . billets up to 12″ square . . . plate up to 6″ thick and 20 ft. long. ALLISON wheels—more than 150 different specifications—rubber or resinoid bond—3″ to 34″ diameters—.006″ to 3/16″ thick.

Expert recommendations from your ALLISON-CAMPBELL Field Engineer can solve your cut-off problems for you. He'll be glad to show you how to get the faster, cleaner cuts you can expect from modern abrasive cutting techniques. Ask him.

WRITE FOR NEW BULLETIN

• Individual analysis of your cutting problems can be made in the new ALLISON-CAMPBELL Demonstration Laboratory. Write for a copy of DH-20, a new bulletin which describes how you can use these facilities. Complete details on ALLISON wheels and CAMPBELL machines are also available.

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AMERICAN CHAIN & CABLE

ACCO

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. . wherever abrasive operations are performed

Questions and Answers

• What can I do to prevent or remedy wheel loading in grinding copper on a cylindrical grinder? I have been using vitrified silicon carbide wheels, 120 grit, H. grade, 6 structure.—M. V. Rochester, N. Y.

Although you have specified the kind of material to be cylindrically ground and the grinding specification you are presently using, there still remain unspecified some very important details of the operation. With the information available, however, a few general observations can be made.

We assume that the problem at hand involves the cylindrical grinding of some form of copper roll rather than an assembly such as a motor armature commutator. In that case a coolant of some kind could be used without necessitating a subsequent drying out and cleaning operation.

Because of the characteristic stringiness of copper, coarse grit wheels and heavy feeds cannot be used without producing very deep scratches and tear marks. Your selection of grit size seems reasonable. It would be our suggestion that a coolant of clear water be used to reduce heating and distortion of the part. Work speeds should be higher than you would normally use for a steel cylinder of like dimension. Comparatively light infeeds with a slow traverse, or in the case of plunge cut grinding, a slight oscillation, can be recommended. This will have a tendency to keep the wheel face open and free from loading. Grinding of copper cannot be forced without disastrous results on the finish.

Another possibility is the use of a resinoid or shellac wheel. •

• How much difference does it make whether a grinding wheel is dressed wet or dry?—J. J. South Bend.

Grinding machine operators may differ widely on the method of dressing or truing a wheel. There is an old saying that if the grinding operation is performed wet, dressing should be performed wet. Conversely, if the grinding is dry, the wheel dressing should also be dry.

It is our observation, however, that wheel truing or dressing with a diamond point should always be performed with a generous flow of coolant directed to the point of contact. The flow of coolant should not be applied after the dressing traverse motion has started. The sudden cooling of the heated diamond point might result in a fractured diamond.

As for dry dressing, for precision grinding, we have known instances where the expansion of the diamond nib was sufficient to produce an objectionable taper in the wheel face and a corresponding taper in the cylindrically ground work.

The use of a coolant during the wheel dressing or truing operation prolongs the diamond life and eliminates objectionable flying abrasive and bond particles. •

• In sanding wood, it always seems that the sandpaper gets clogged up and must be discarded before it is really worn out. Have you any suggestions for getting better life out of sandpaper used for wood sanding?—G. R. Hartford, Conn.

While machine sanding equipment is more or less common in home workshops, we have assumed from the nature of your question that you are using coated abrasive paper over a sanding block and performing the job manually.

If your material is clear and free from shellac or filler, a lessening of applied pressure will permit the dust to roll out, rather than be forced into the abrasive surface. Ofttimes a simple slap of the hand or several raps of the block on a flat surface will dislodge the sawdust.

On portable sanders oscillating and in line, it is likewise important to use light rather than heavy pressures. On belt and disc sanders, the piece should be continuously traversed across the face of the abrasive. If sanding is performed without movement of the work, excessive heat may be generated, causing the bonding glue to soften and resulting in a smeared and loaded surface.

On the harder woods, it is possible to use what is termed an open coat paper. Grain particles cover only about 50 to 70% of the surface, and the tendency to load is greatly reduced. •

A reader comments:

Re J. H.'s question, on page 32 of the current (July) issue, as to the difference from lot to lot of identically graded wheels, I believe that many an operator will remove a grinding wheel which is worn down to two-thirds or less of its original size, replace it with a new wheel of identical markings and manufacture, and possibly even from the same lot, and decide the wheel acts differently, because he did not or could not adjust the wheel speed to allow for the difference in circumference. While the matter is mentioned in Mr. Rakestraw's reply, I believe it is a more common cause for complaint or inquiry than is often thought.

H. Landauer
Tampa, Fla.

"Easy Accuracy"

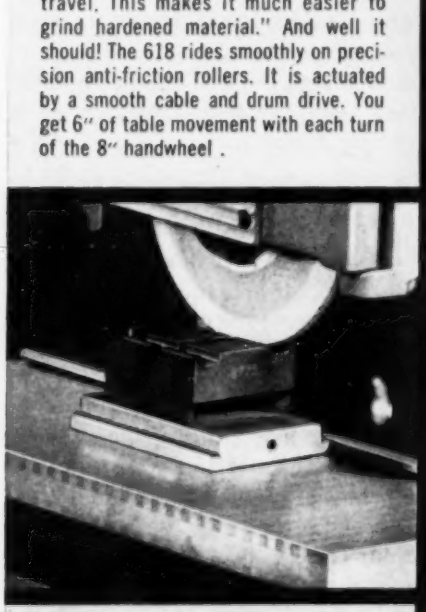
That's what one Big Cleveland Gage Maker says about

ABRASIVE *six eighteen*

Hand Feed Precision Surface Grinders

"Our new 618's", reports Bob Pringle, General Manager of Winslow Manufacturing, Cleveland, "are what we've needed to help us stay on top as the **first name in precision control.**" With Abrasive's modern design and 'operator engineered' features, the story is the same in precision shops all over the country.

At Winslow, "the feature which most impressed our employees is the fast table travel. This makes it much easier to grind hardened material." And well it should! The 618 rides smoothly on precision anti-friction rollers. It is actuated by a smooth cable and drum drive. You get 6" of table movement with each turn of the 8" handwheel .



Bob Pringle goes on to report, "we have used the machine primarily for gage work and find that the finish is very good. It's excellent for side grinding, too." Heavy, rugged, deeply-ribbed construction plus the advantages in Abrasive's motorized spindle and wheelhead assembly make high finishes easy.

Precision and efficiency are vital at Winslow, and they found "the good repeatability of the 618 dial settings to be of special advantage." All operators appreciate the comfortable, balanced feel of the smooth recessed handwheels, available either right or left-handed. They like the comfort and convenience of the controls all located on the same waist-high plane.

It makes good sense for you, too, to look into the many profit-producing advantages of the new Abrasive 618's. Without obligation our colorful eight-page tell-all brochure is yours. **Write for it, today!**

ABRASIVE MACHINE TOOL COMPANY

Dexter Road
East Providence 14, Rhode Island

ABRASIVE

wherever abrasive operations are performed

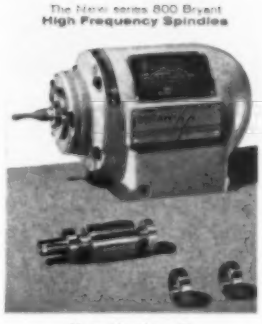
Free Literature

1. Cut-Off Wheels. Folder available gives abrasive specifications for quick cutting of tubes, bars, angles, rods, moulding, pipe and similar work composed of material as carbon, cast iron, granite, rubber, slate, etc. These specifications are for grinding dry or wet. Important features of the wheels are also given. The Peninsular Grinding Wheel Division, 729 Meldrum Ave., Detroit 7, Mich.

2. High Frequency Spindle. The series 800 Bryant high frequency spindle catalog has been recently revised and expanded to include more information on spindles available for Centalign grinders. The speeds of 10,000 to 100,000 rpm and fine finishes of ¼ of a microinch are given, as well as special applications for the spindles. Motors of speeds to 200,000 rpm are available. Bearings, coolants, lubrication and power source are described. For easy ordering, type 2 spindles and the quills are listed in chart form. The type 1 spindles are built specially to the customer's specifications. Spindles for the Model C Centalign, and quills, are listed so as to make it easy for the customer to order. The frequency required to operate the spindles is obtained by using an alternator obtainable, with frequencies from 180 to 1500 cycles/sec. variable. Special spindles may be ordered. A reconditioning service is also offered. Bryant Chucking Grinder Co., Springfield, Vt.

3. Diamond Tools of the most widely used types are given in a recent catalog. A chart enables selecting the correct size diamond for any type wheel. Single stone diamond wheel dressing tools, which can be reset many times, are diagrammed, as well as diamond tools for internal, thread and gear grinding. Cluster tools, which can be used by semi-skilled personnel on roughing operations, are clearly described. Diamond tools for wheel forming and truing, as well as diamond turning and boring tools, are made from the customer's descriptive information. The manufacturer can tailor tools of a special nature for the customer. New York Diamond Tool Co., Inc., 360 Glenwood Ave., East Orange, N.J.

4. Clamping Tools. A colorful catalog contains application, construction, specification and price data on over 400 clamping tools. Photographs and drawings are helpful. A color coded index, which groups all products in each category through use of different background colors, provides quick reference to all pages. Introductory pages give the latest developments in clamping tool manufacture and use. The manufacturer's powered clamping tools are shown to improve methods, speed production, and reduce production costs. Construction details of the Wilton Perma-Pad, a loss-proof C-clamp swivel pad, are outlined. Wilton Tool Mfg. Co., Inc., Schiller Park, Ill.



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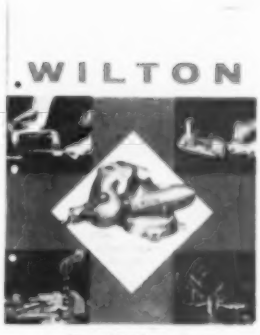


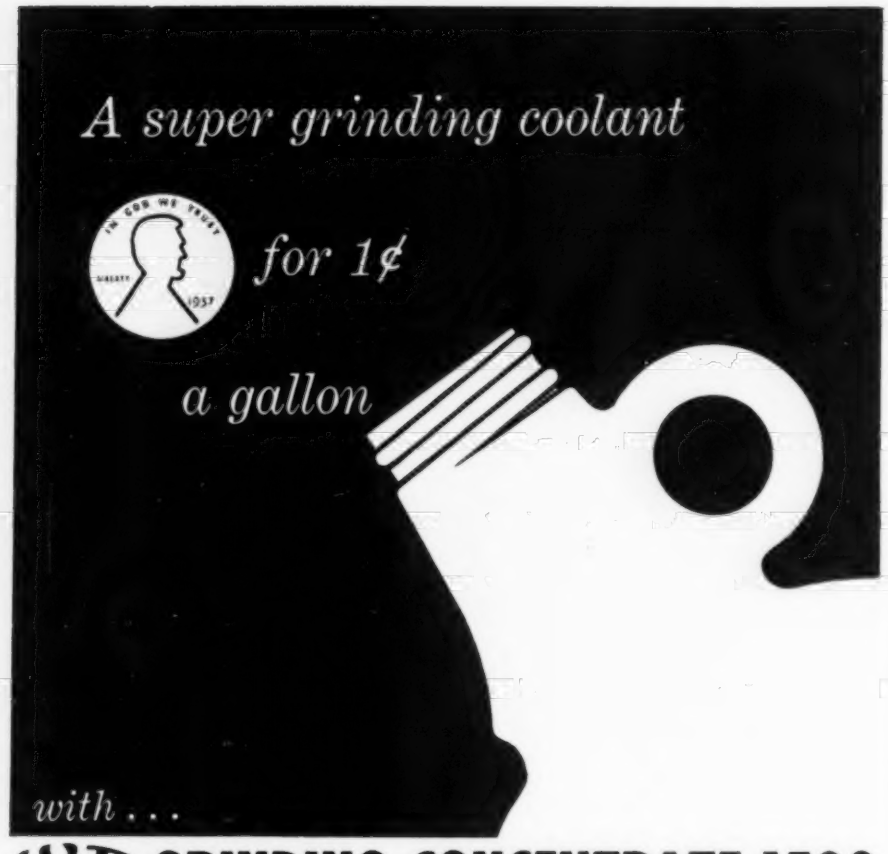
(See Number 4)

5. Buffing and Polishing Machines are described in a four-page booklet which incorporates the company's one-hand adjustment for wheel wear. The machinery contained in the booklet is all job-engineered to specific problems. Among some of the machines described are a circuit conveyor with head units, which can be utilized in a complete in-circle production line, or in a double production line with two operators, and a Job-O-Matic Jr. work table with chain chuck and variable speed drive for use with various types of polishing. The Model DLS abrasive belt head is designed for polishing contours, but equally effective with flat work. A single stage automatic buffing machine handles round out-of-round reflectors, in addition to other odd shapes and contours. Divine Brothers Co., Seward Ave., Utica, N.J.

6. "92 Time Savers for Tool Makers" is the title of a catalog available. The tools are listed by categories, and are indexed. The tools listed are shipped on approval. This listing includes drill press tooling, surface grinder tooling, lathe tooling, inspection tools, milling machine tooling, angle plates, band saw tooling, and punch press accessories. Each item is very clearly described, sometimes diagrammed, and tabled specifications given where necessary. No doubt is left as to the tool's usefulness and value. Montgomery & Co., Inc., 7 Tichenor Lane, Newark 2, N.J.

7. Rubberized Abrasives. An eight-page catalog of rubberized abrasives for deburring, smoothing and polishing is now available. It explains the many step-saving and quality-improving uses of rubberized abrasive wheels, points, blocks, sticks and cones. It contains operating instructions, tables, illustrations, and the latest technical data. The rubber abrasives are made with first quality silicon carbide in form standard mesh sizes in coarse, fine, medium, and extra fine. Cratex shaped wheels have a tapered edge for fine work on small parts, and come in diameters of 3/8", 5/8", 1/4", 9/32". The small straight wheels, in 1/2" to 1" diameters, can be mounted on portable motor tools. The large straight wheels, in various thicknesses and in arbor hole sizes, remove rust, heat marks and tarnish. Diameter sizes are from 1 1/2" to 10" diameter. Maximum operating speeds are up to

Use the postpaid card opposite page 98 to receive your copy of any of the literature listed on these pages. Just circle the proper number on the card which coincides with the number which precedes the paragraph. We'll do the rest.



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Normal dilution for this entirely different type of coolant is from 150 to 200 parts of water to 1 part W & B Grinding Concentrate 1500. And since W & B 1500 is used in extreme dilutions, one 55-gallon drum provides up to 11,000 gallons of grinding coolant — at a cost of about 1¢ a gallon.

Foamless as water, W & B 1500 gives excellent rust protection and provides a transparent mix that really keeps wheels open. Grinding is keener . . . machines stay cleaner. Chips settle almost instantly. Get complete information on this outstanding grinding concentrate. Fill out and return attached coupon.

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☐ My plant has a tricky grinding problem on which we'd like advice. I've attached a letter describing it in detail. I understand that you offer this service without obligation.

FREE LITERATURE *continued*

25,000 rpm. Tool and die makers' kits, as well as polishing kits, are described. Latest price lists are included. Crafx Manufacturing Co., 1600 Rollins Rd., Burlingame, Calif.

8. "Cutting Trends" is the title of a new quarterly publication which will discuss the latest trends and advances in the design and application of grinding wheels, shear blades and machine knives for metal-working, wood, paper, and allied

KEYSTONE
CUTTING AND GRINDING FLUIDS

industries. The first issue includes an article on Mirro-Keen, a new paper knife finish said to give longer life and superior cutting characteristics. A question and answer section on specific grinding and cutting problems is included. Simonds Worden White Co., 1101 Negley Place, Dayton, Ohio.

9. "Keystone Cutting and Grinding Fluids" booklet, called the Bulletin BK-21, describes the manufacturer's complete line of cutting and grinding fluids for the metalworking industry. It includes six specialized products—three oil-type and three water-type lubricant-coolants. Illustrated with photographs, the booklet helps choose the right cutting and grinding fluid for a particular operation. Machinability rating charts list the machinability and hardness ratings of six A.I.S.I. classes of metals. Selection charts list the correct oil-type and water-type fluids for the 12 most common machining operations. Keystone Lubricating Co., 3100 N. 21st St., Phila. 32, Pa.

10. Size Control Units. The Microtrol type 150, in three models, is designed for size-control use on external plunge grinders. The booklet available states there is no difficulty in holding part tolerances better than 50 millionths inch on a grinder in

reasonably good condition. Applications to the grinding machine are presented in diagram form. Each model includes an electronic control unit, gage head, gaging caliper, and caliper suspension and mounting. The Production-3 (three-point control for production-type grinders) is used on

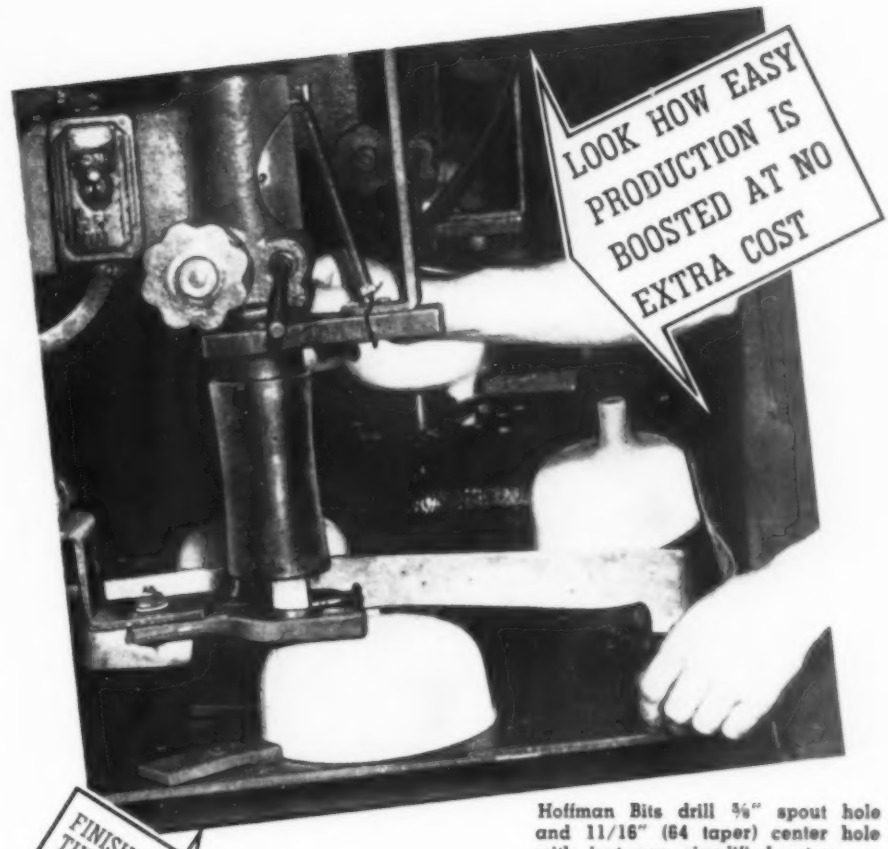
external plunge grinders equipped for electrical control of change from fast to slow infeed, change from infeed to dwell, and wheel withdrawal at final size. The Production-2 is for applications similar to the Production-3, except that it does not provide automatic control over the change from fast to slow infeed. The Job-Shopper is intended for gage-aided manual control of grinders that do not have facilities for electrical control. Accessories for the Job-Shopper, gage head, gage-head extension cables, and calipers and suspensions are also included. Airborne Instruments Laboratory, Inc., 160 Old Country Rd., Mineola, N.Y.

11. Products for Automatic Filtration of Oil. Catalog No. 157 presents the most complete line of automatic moisture separators, lubricators, regulators, filters

and filterators for compressed air systems. The catalog details the automatic draining of receiver tanks as well as the usual separation of moisture, regulation and lubrication of compressed air. In addition, the products for automatic filtration of oil, oil fumes and solid contaminants (to as small as three microns in size) are described. Wilkerson Corp., 1559 W. Girard Ave., Englewood, Colo.

12. Mist Coolants. "Modern Lubrication" is the title of the manufacturer's publication demonstrating the use of his products in case histories, particularly his mist coolant unit. The Spraymist integrates all necessary controls and operating elements in a single machined-style unit, with no extra valves, controls or plumbing needed. The Black Diamond and Worcester drill grinders turn out precision-ground drills, and the 18 oz. mist coolant unit has helped provide better finishes with increased drill life. The Type A automatic lubricator is described in use on a printing press. The Cyclic Type P and R automatic lubricators and window units are also described in case histories. Bijur Lubricating Corp., Rochelle Park, N.J.

13. X-Ray Oriented Diamond Tools. Folder describes a development whereby an X-ray technique makes it possible to exactly position a diamond so that its maximum hardness and abrasion resistant properties can be fully utilized. Waste, resetting, and tool turning are eliminated and Di-X tool life is said to be increased as much as ten times. Each diamond tool is certified that it has been correctly oriented for its specific use. Photographs show how the diamond is oriented and then checked for quality control. Advantages and savings for users of diamond boring, turning and grinding wheel dressing tools are discussed. Abrasive Dressing Tool Co., 14528 Second Blvd., Detroit 3, Mich.



Hoffman Bits drill 5/16" spout hole and 11/16" (64 taper) center hole with just one simplified set-up.

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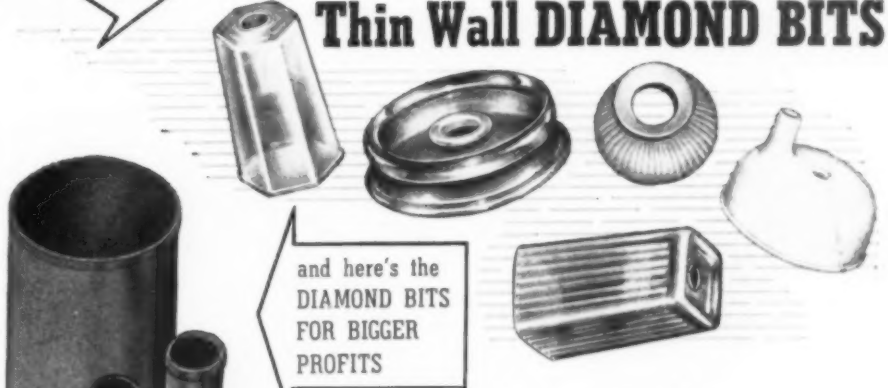

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Hoffman Thin Wall Bits assure the highest production per bit available anywhere . . . because every bit is designed for the specific job. They produce the efficient, close tolerance results that cut job-time . . . eliminate many reject losses. Put Hoffman Bits to work and see why so many producers are setting new profit records in drilling and finishing glass, ceramics, porcelain, quartz, concrete and many others.

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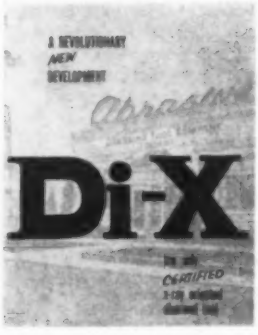
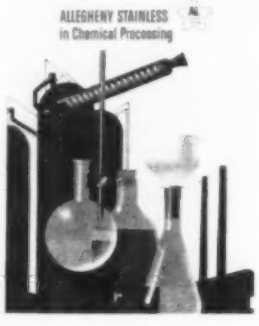


(See Number 13)

14. Stainless Steel. A revised 40-page booklet on the use of stainless steel in the chemical industry is now being distributed. It embodies sections on the process industries, the plastics industry, petrochemical industry, and others. A section is given on the fabrication of stainless steels into industrial equipment and articles of everyday use. The extent to which grinding, polishing, and buffing operations are employed in steels depends



on the application a given equipment is to serve. Some environments require the highest degree of smoothness of surface. Flow charts are included for the processing of nitric acid, typical plastics, detergent, production of flaked ammonium nitrate, among other flow charts. A comparative table on stainless steels and a table on the corrosion resistance of stainless steels to various media are given. Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.

15. Dust Collectors. The Uni-Wash dust collector, a self-contained recirculating water type unit, converts dust into wet sludge which cannot burn or explode, as described in catalog available. No moving parts or agitators are employed. The Jr. dust collector, in 500, 1000 and 2500 cfm capacities, is designed for maximum dust removal from a small volume of air. The Sr. collectors, in 5000, 7500, 10,000, 15,000, 20,000 cfm and greater capacities, are ideal for removing dust from the operation of a large number of grinding or other finishing machines. Special dust collectors are furnished with belt-driven fans. Down-draft bench dust collectors, with and without hoods, are described. Photographs and diagrams are included, showing the operations of the various machines. DeVilbiss Metal Fabricators Co., 5741 Russell St., Detroit 11, Mich.

16. **Diamond Wheels and Tools.** Types of diamond wheels as straight, flaring cup, plain cup, and dish are clearly diagrammed and numbered for identification in recent catalog. Specification tables, for ordering, give the wheel number, diameter, thickness, hole size, etc., on all the diamond wheels. Described in the front of the catalog are the resin bond diamond wheels for off-hand and fixed grinding of tungsten carbide single point

and multi-tooth tools. Diamond wheel shapes, for off-hand to fixed grinding, are given. Grit size recommendations are included, as well as bond hardness. The Al-Aloid wheel grinds carbide .005" to .062" in one pass in seconds. A Spra-Kool coolant has been designed for all types of dry grinding and polishing jobs. A recent price list is enclosed with the catalog. A.I.T. Diamond Tool Co., 8221 N. Kimball Ave., Skokie, Ill.

17. **Precision Tooling Service.** A four-page, two-color brochure describing precision tooling and machining facilities offered by Lenkeit Machine & Tool Co., Inc., has just been issued. The firm specializes in intricate tool and die work for the instrument, electronics, electrical and printed-circuits industries. The publication details the firm's diversified equipment, which includes electrical discharge machines, profile grinders, a battery of jig boring and jig grinding machines, and a line of high-production power presses. Lenkeit Machine & Tool Co., Inc., 24 Allen Blvd., Farmingdale, L.I., N.Y.

18. **Sintered Tumbling Shapes.** A bulletin and accompanying data sheets are now available covering a new type of sintered metal tumbling media, under the registered trade names of Sintabur, Sintabrite, Sintahone, Sintacut, and Sintacote. The media can be supplied pre-charged with polishing or cutting abrasive. Tests indicate up to ten times greater life. A total of eleven different types are currently obtainable, three of which have specially designed serrated file-type cutting edges on all surfaces. Within each type, shapes are said to be precisely uniform, and will not break down, disintegrate or lose their original cutting characteristics with repeated reuse. The bulletin includes information on the application of standard Sintaloy ferrous, non-ferrous and impregnated media types for wet and dry grinding, deburring, and burnishing a wide range of metallic and plastic part materials. Dixon Sintaloy Inc., 535 Hope St., Stamford, Conn.

19. **Diamond Wheels.** A 28-page catalog announces the new metallic and resinoid bonded Diacraft diamond grinding wheels. The wheels are diagrammed with tables giving specifications and price lists. Instructions are given for ordering. The prices apply to grit sizes No. 600S and coarser and are subject to discount; prices

Keeping in shape for the old grind...

For more than seventy years, J. K. Smit has grown with industry, by helping industry to grow.

As abrasives were improved, and became a vital part of manufacturing, J. K. Smit developed the materials and techniques necessary to make the tools to true and dress abrasive wheels.

Today, J. K. Smit produces quality diamond tools for trueing, dressing, and contouring every type of abrasive wheel ...For doing the jobs too tough to be done economically by anything but industrial diamonds.

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NEW
ENGELBERG
SERIES 96
ABRASIVE BELT
MACHINES

AVAILABLE WITH FROM ONE TO SIX OR MORE GRINDING HEADS

CAPACITIES:

6" x 96" Belt:
5½" max. width and
6½" max. thickness

9" x 96" Belt:
8½" max. width and
6½" max. thickness

12" x 96" Belt:
11½" max. width and
6½" max. thickness

OPTIONAL FEATURES:

Electro-Magnetic chucks
Powered elevation of grinding heads
Built-in coolant filtration system

From the leaders in the industry . . .

The new Series 96 Heavy Duty abrasive belt machines are built to deliver toolroom precision in continuous production runs.

High speed multiple grinding and finishing operations are performed in the same time required for a single operation. Rapid, exceptionally heavy stock removal permits unmachined surfaces to be ground to fine finishes and exacting tolerances in one continuous pass.

Heavier construction and solid, one-piece work table enable Series 96 machines to maintain tolerance standards of ± .0005 on flat finishing, with stock removal up to ½" per head on ferrous material.

Conveyorized feed is adjustable, ranging from 0' to 67' per minute. Both conveyor and abrasive belts feature pneumatic tensioning.

Rapid-traverse grinding heads are equipped with #50-taper hardened precision ground spindles, with super-precision taper roller bearings.

Representing the peak of development in abrasive belt machines, Series 96 take their place beside the finest of machine tools for speed, precision, reliability and cost reduction.

Write today for free catalog sheet containing complete information and specifications on the Engelberg Series 96 abrasive belt machines.

ENGELBERG, INC.

Precision **ABRASIVE BELT GRINDERS**

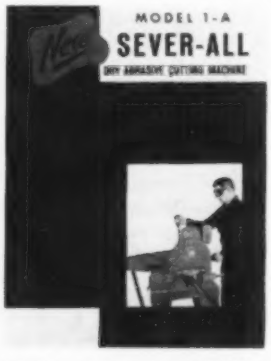
329 SENECA STREET • SYRACUSE, N. Y.

FREE LITERATURE *continued*

for sizes finer than that will be forwarded on application. The wheels, incorporating a new metallic bonding process, are made in all the customary shapes and sizes for carbide grinding as well as custom-made wheels for special applications. The metal

bonded diamond wheels have also been developed for use on glass, quartz, ceramics, refractories, and other hard non-metallic materials. The resinoid diamond wheels exhibit free-cutting properties as a result of close grading of the diamond grits, and are claimed to be long lasting because of their heat-resisting qualities. Diacraft, Inc., 26538 West Seven Mile Rd., Detroit 40, Mich.

20. Dry Abrasive Cutting Machine. The Model 1-A Sever-All dry abrasive cutting machine is described in four-page folder DH-106. This cutter, according to the manufacturer, cuts practically all metals—solids up to 2" square, pipe and tubing up to 3½" O.D., angle iron up to 3"x3"



and channels up to 4". Oscillation of the cutting wheel enables the unit to cut larger cross-sections rapidly with a fine quality cut, it is reported. For larger cuts, provision is made for manual oscillation of the cutting wheel. Specifications such as rated capacity, power required, cutting wheel diameter, dimensions and weights are listed. Optional accessories, for angle cutting and repetitive cutting, have been included. Allison-Campbell Division, American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

21. Centrifugal Oil Extractors are described in brochure issued recently. The oil extractors are designed with pan diameters of 30" or less. This permits the combination of rapid acceleration and high running speed necessary to produce forces which overcome surface tension and adhesion to strip oil from the chips. A graph illustrates the percentage of oil reclaimed by the extractors as compared to belt-driven machines. Features such as gyro-

scopic balancing (for smooth, vibrationless operation), safety interlocks, and chip pins are described. The spindle post and carrier type extractors are discussed, with their

specifications for ordering. Heavy-duty extractors have been designed for severe operating conditions. The Leon J. Barrett Co., P.O. Box 378, Worcester, Mass.

22. Profile Grinder. The Pruitt Profiler P-500, profile grinding and routing machine, is described in folder obtainable. The micro-feed guide button, which is said to afford greater precision and higher production, allows the reproduction of contours to tolerances of .0005" automatically, according to the firm. Operations as template making, reproduction of parts from templates, and die sharpening become rapid and semi-automatic operations. Materials as wood, metals, plastics, glass or rubber may be ground, milled or routed. Finger-tip speed control is said to offer instant, precise speed settings from 100 to 45,000 rpm. The folder gives complete specifications, with optional equipment listed. Tool-Lab, Inc., Escondido, Calif.

23. Wet Blast Applications. Precision finishing by the wet blasting method is the subject of bulletin No. 100. The new Wheelabrator operation manufactures equipment for both the wet blasting and barrel finishing methods of precision finishing. Illustrated and described are efficient applications of the Wheelabrator Liquamatte Model 43 wet blast equipment, now marketed as part of the Techline Division product line. Techline Division, Wheelabrator Corp., 1169 Avenue V, Vicksburg, Mich.

24. Honing Machine. The new Model AM honing machine is one of the features of a 30-page catalog. Four honing machines, two honing heads which are adaptable to drill presses, mandrel driver, mandrels and abrasive stones are described. Superior Hone Corp., 1637 Elreno St., Elkhart, Ind.

25. Barrel Finishing Equipment. Bulletin No. 200 describes the Model 30 Series Techline barrel finishing machines. Specifications of 20 standard models are included, along with details of design innovations. Techline Division of Wheelabrator Corp., 1169 Avenue V, Vicksburg, Mich.

26. Abrasive Cutting Center. Folder DH-20 describes the Allison-Campbell demonstration laboratory. The full complement of Campbell abrasive cut-off machines—the chop stroke, oscillating, horizontal and rotary types for dry, wet or submerged abrasive cutting processes—are displayed. Solid bar stock and structurals up to 12" x 12", plate up to 4" thick, and pipe or tubing up to 8" O.D. can be cut in a matter of seconds. The manufacturer is able to offer an impartial recommendation for the best method, correct machine and most efficient wheel for any abrasive cut-off problem. Companies are invited to submit samples of stock and/or witness cutting tests. Allison-Campbell Division, American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

"All right, you guys! Who's the 'apple-polisher'?"

"We Cut Form Grinding

COMPLEX GRINDING WHEEL FORMS ARE PRODUCED IN MINUTES *... by simply traversing the tracer lightly over an easily made template. A 10-to-1 ratio between template and truing diamond insures work accurate to "tenths."*

WRITE NOW FOR FREE PRODUCT LITERATURE ... and see for yourself how a P&W Diaform Attachment can bring new speed, precision and economy to your form grinding operations. Just fill in and mail the handy coupon.

Time OVER 33% . . .

Using P&W Diaform Wheel Forming Attachments," says The B. JAHN Company.

Using Pratt & Whitney Diaform Wheel Forming Attachments, the B. Jahn Company, Inc. of New Britain, Conn. now form-trues grinding wheels—accurate to .0002" or better—*in minutes!* As a result, average time for producing the high-precision contoured punches and dies, which this company supplies to the aviation industry, has been cut 33%. Costs have been cut proportionately and busy machines released for other work. B. Jahn also likes the Diaform's *portability*, light weight, low initial cost and easy operation. As B. Jahn's chief engineer states, "We can take a man—and don't have to take our most experienced man—and in no time at all have him turning out precision work that is *better* than the old timers could *ever* do by other grinding methods."

PRATT & WHITNEY COMPANY
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6 Charter Oak Boulevard, West Hartford 1, Connecticut

Please send my free copy of P&W Diaform Circular No. 543-3.

NAME _____ POSITION _____
COMPANY _____
CO. ADDRESS _____
CITY _____ ZONE ____ STATE _____

... wherever abrasive operations are performed

New Equipment and Materials

4-Station Grinder Combines Flexibility With High Production

A 4-station Mattison grinder is designed for rough and finish grinding head bearing sections of rock bits and similar parts for mining, quarrying, and oil-field industries. Although a high-production, automatic machine, the grinder is able to handle bit sizes ranging from 3½" to 9⅞". Adjustable fixtures provide handling of a wide range of work.

Three work stations, plus a load and unload station, are included in the grinder. At work station No. 2 the top of the pin is ground flat. At station No. 3 the pin diameter is rough-ground during the first part of the cycle, and the pin and the adjacent shoulder are rough-ground and the pin is chamfered at the end of the cycle. At station No. 4 the pin diameter and shoulder are finish-ground. The machine cycle is automatically controlled from the console which is provided with indicator lights that show a visual record of the work status.

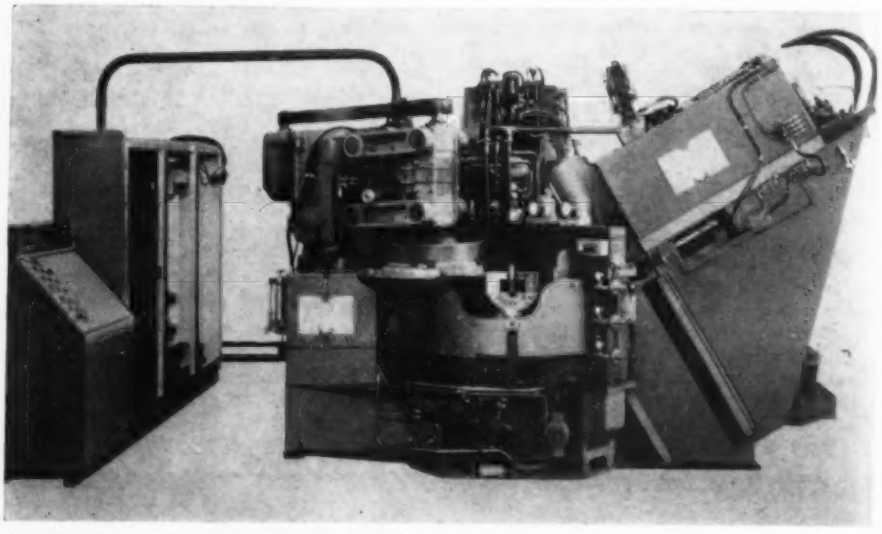
In addition to the automatic cycling of work, precision automatic sizing to compensate for wheel wear is also built into the machine. Following each operation pieces are automatically gaged, and the gaging head signals the machine to feed in as required, insuring that finished work is always within limits.

A patented package Mattison grinding head of parallelogram design is used at station No. 2, with inclined heads at stations 3 and 4. Two basic types of parallelogram heads in three sizes are available—precision models (for a high degree of accuracy) or foundry models (for a high rate of metal removal).

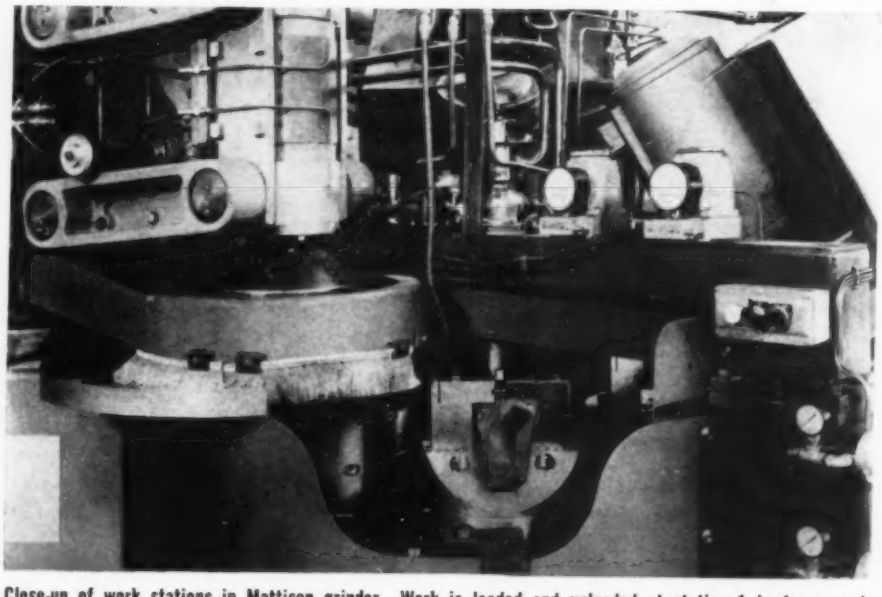
This grinder has the precision type of head, incorporating a hydraulic cylinder feed working against an adjustable lead screw stop. Both rapid approach and fine feed strokes are provided in this design, and both have controllable feed rates and adjustable limits. Precision limit switches control and interlock all operations.

Mattison Machine Works, Rockford, Ill.

Use postpaid card. Circle No. 101



Over-all view of multi station production grinder.



Close-up of work stations in Mattison grinder. Work is loaded and unloaded at station 1 in foreground, while three work stations perform rough and finish-grinding operations automatically.

For further information on any of the products listed here, use the handy postpaid card opposite page 98.

CHICAGO

mounted wheels

are America's finest

Chicago Wheels are available in all standard sizes and over 200 special shapes. This wide selection of these tough, fast cutting Chicago Mounted Wheels makes it possible for you to choose just exactly the right mounted wheel for your job. And delivery of most Chicago Mounted Wheels is prompt . . . right out of stock.

TRY CHICAGO MOUNTED WHEELS TODAY

Let us send you two samples of these true-running uniform Chicago Mounted Wheels. Try them at no cost to you. Send coupon below.

WHEN YOU THINK OF MOUNTED WHEELS SPECIFY . . . CHICAGO!

CHICAGO MOUNTED WHEELS are manufactured under positive density control to insure peak job performance.

GUARANTEED to stay on their mandrels, they are perfectly balanced, easily dressed, and hold their shape.

SAVE TIME, MONEY, MATERIALS . . . any number of combinations of dimension, shape, grain size and bond.

Chicago Wheel and Mfg. Co.

1101 W. Monroe Street, Chicago 7, Illinois

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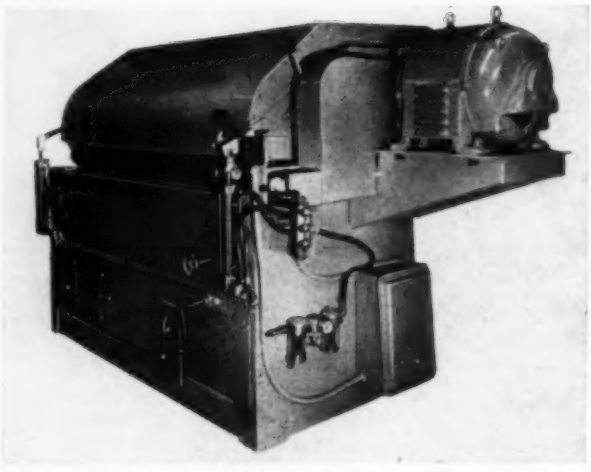
City ..... Zone ..... State .....

New Line of Heavy Duty Sanders



The Timesaver Speedbelt sanders now have a new ram type construction with automatic jet air abrasive belt tracking. This feature is said to permit accurate control at high speeds of heavier type work. Special conveyor belt and roller feed assemblies are available.

The new heavy duty, high speed models are built in 24" to 54" belt widths. The sanders can also be equipped with dual action polishing platen for a 2-in-1 cutting operation on wood and other materials, except metal.

Timesaver Sanders, P.O. Box 7446, Robbin dale Station, Minneapolis 22, Minn.

Use postpaid card. Circle No. 102

Precision Grinder Permits Two Operations Formerly Required in One

The Engelberg Model No. 696 precision abrasive belt grinder permits two or more high-speed grinding and finishing operations in the time formerly required for a single operation. Unmachined surfaces, ground on a series of progressively finer-grit abrasive belts, can be finished to a fine polish to exacting tolerances in one continuous pass. For parts requiring rapid but exceptionally heavy stock removal, identical belts can be used.

The model, available with from two to six or more individually-adjustable grinding heads, offers an extensive capacity range, handling parts up to 5½" maximum width and 6½" maximum thickness. The machine's conveyor belt, which carries parts under the grinding heads, is infinitely adjustable for feed rates from zero to 67' per minute. Optional features are obtainable.

The speed of the 6" x 96" abrasive belt is 5400 sfpm. Machine drive is 7½ hp, 3600 rpm, with 10 or 15 hp optional. Over-all dimensions of the two-head model are 87" high, 110" long, 75" wide. The size of the conveyor belt for the two-head model is 7" x 178".

Engelberg, Inc., 831 West Fayette St., Syracuse 4, N.Y.

Use postpaid card. Circle No. 103

Measuring Indicator Features Infinite Travel

The Trav-A-Dial, for use with any machine tool, measures complete longitudinal travel of the machine, as well as transverse and vertical travel on certain tools. The instrument reads any length in 6" increments, furnishing a visual record in inches, hundredths and thousandths on its large, easy-to-read dial. The indicator is reported as accurate within .001" in 6" of travel and repeats unfailingly. No plungers are used, no measuring rods or other devices are required.

On lathes, the instrument enables operators to pick up lineal measurements without using stops or resorting

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Cut your costs - increase your performance
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For almost 100 years a leading supplier to Europe's Industry. During the few years that VSM Coated Abrasives are available in the U.S. Market they have found enthusiastic acceptance for,
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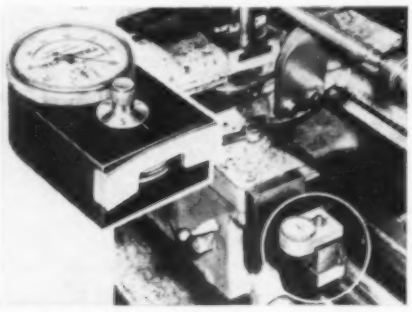
Some interesting territories still open for Distributors

to other measuring means. It is used for boring blind holes, turning shoulders



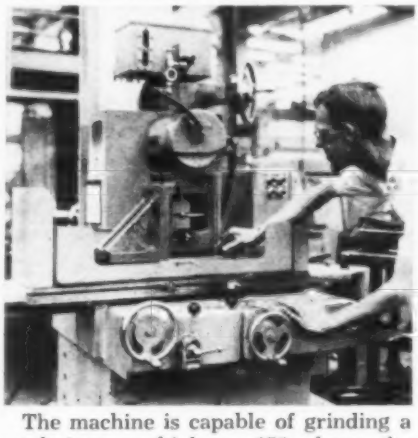
or grooves to exact tolerances and spacing, and in making set-ups. Errors on mills, which result from worn lead screws, backlash, or changes in table position, are said to be eliminated.

M. E. Hodge Corp., 35 N. Raymond Ave., Pasadena 1, Calif.

Use postpaid card. Circle No. 104

6" Surface Grinder Offers Table Traverse Speed Of 125' Per Minute

The Norton 6 x 18" type S-3 hydraulic surface grinder claims a substantial increase in table speed which is reported to reduce grinding time as much as 50%. The maximum table traverse speed is 125' per minute, which reduces grinding time, as well as reducing burns, checking and cracking of the work.



The machine is capable of grinding a workpiece as high as 15" above the work table with a standard 8" diameter grinding wheel.

The accurate hydraulic cross feed at each table reversal is easily set by a graduated dial type knob. A two-speed vertical feed handwheel provides rapid movement for positioning and a fine feed, graduated in increments of .0001", for precision feed. Contouring of the wet attachment splash guards allows the operator to see the work and the wheel easily, contributing to fast, easy setup.

Setting up the work is further simplified by the centered reversing lever which permits the operator to line up the table dogs with the ends of the work.

Optional equipment is available. The machine can be arranged for wet grinding, coolant through the wheel and electrolytic assist.

Norton Co., Worcester 6, Mass.

Use postpaid card. Circle No. 105

Magnetic Chuck & Automatic Control Speed Grinding

The Selectron automatic chuck control and Power-Grip magnetic chuck provide variable holding power and a "demag" cycle that eliminates all residual magnetism, it is reported. This enables the removal of fragile workpieces without distortion.

The demagnetizing feature permits swift and thorough chuck cleaning. The 24 volt circuit keeps chuck and workpiece cool.

The matched units are available in direct and remote control models in a range of sizes.

The DoAll Co., Des Plaines, Ill.

Use postpaid card. Circle No. 106

ATLANTIC WHEELS

cut work fatigue to a man-saving minimum!

Ask the men who use them — Atlantic Grinding Wheels have a smooth, floating action that requires less grinding pressure, keeps operators fresher for longer periods throughout the daily work schedule. Even where metal removal is roughest, you can count on Atlantic Wheels for fast, cool, clean-cutting performance . . . depend on their rugged resinoid bond for maximum on-the-job safety.

A trial run in your plant will quickly prove their worth in money-saving terms. Have an Atlantic representative recommend the right wheel for your specific requirements. Meanwhile, write for your free copy of the Atlantic Grinding Wheel Catalog. Atlantic Abrasive Corp., 532 Pearl Street, South Braintree, Massachusetts.

Atlantic Abrasive Corp.

A DIVISION OF ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

STRAIGHT WHEELS • CYLINDER WHEELS • CUP WHEELS
CONES • PLUGS • MOUNTED WHEELS AND POINTS

Gear Inspection Unit Checks and Charts Gears

A Red Ring gear inspection-recording unit that automatically checks gears for both size and helix angle accuracy, rejects out-of-tolerance parts and makes a chart record of the measurements is now available.

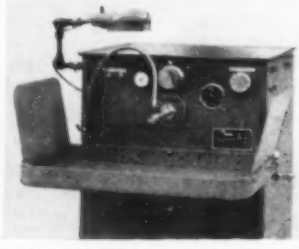
The unit consists of a gear gaging machine, a control panel, and a charting device.

Gears to be inspected are fed into a storage chute in the gaging unit. A check of size and helix angle accuracy is made by rotating the gear in mesh with a rotating upper master gear. In further processing, electronic sensing heads cause out-of-tolerance gears to be dropped out. Signals from the sensing heads are picked up by the recording unit which indicates measurements on an inked paper chart.

National Broach and Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Use postpaid card. Circle No. 107

Honing Machine Features Variable Speeds of 250-1400 rpm



The Model AM tri-purpose honing machine has infinitely variable speeds of from 250 to 1400 rpm of the sealed ball bearing spindle, according to the report. A tachometer is provided for accurate setting of speeds. A dial indicator also is available. The 14-gallon capacity coolant tank is removable for easy cleaning.

Superior Hone Corp., 1637 Elreno St., Elkhart, Ind.

Use postpaid card. Circle No. 108

Tumble-Barrel Finishers Have Interchangeable Compartments

Models V4 and V6 finishers have 4 and 6 cu. ft. barrels with two or three interchangeable compartments respectively. Both models have 23 rpm fixed speed drive, or an optional 12 to 36 rpm variable speed drive. Semi-enclosed cabinet design gives adequate protection.

Features include orange-colored no-seam vinyl barrel linings, direct chain and sprocket drive, and a selection of timing and control accessories.

Rampe Manufacturing Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Use postpaid card. Circle No. 109

Cutting Machine Has Oscillating Action of the Cutting Wheel

The Sever-All 1-A machine features oscillating action of the abrasive cut-

WITH BETTER PROFITS KRAMER FINISHING EQUIPMENT

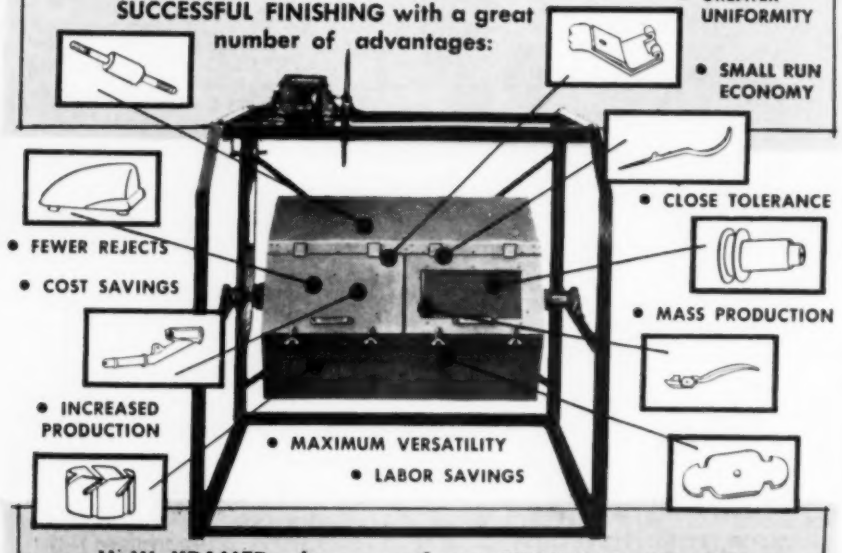
Development of New Methods Cuts Costs!

The greatest money-saving opportunities in Metal Finishing is yours now . . . in the use of H. W. KRAMER barrel Finishing!

Now, you can finish parts by the hundreds instead of the conventional methods that finish 1 part at the time. It's real easy work . . . it's childs play!

SAMPLE PARTS PROCESSED and a SPECIFICATION SHEET SUPPLIED TO THE MANUFACTURER.

Only Kramer's Tumblers & Buffers give you SUCCESSFUL FINISHING with a great number of advantages:



H. W. KRAMER solves any of your FINISHING PROBLEMS. Guaranteed prompt assistance in solving and determining the proper finishing procedure.

Write Dept. 76 for Free Literature.

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NEW ENGLAND REPRESENTATIVE
Russel E. Smith
98 Green Hill Road
P.O. Box #345
Westwood, Mass.

FLORIDA REPRESENTATIVE
Ace Plastic Materials
5541 NW 37th Avenue
Miami, Fla.

ting wheel, which enables it to cut large cross-sections with a fine quality cut. A hand lever provides for manual oscillation of the cutting wheel.

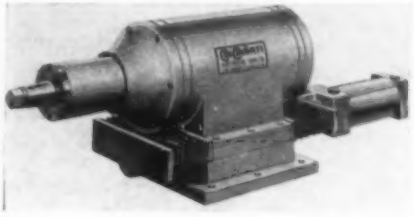
The high speed dry abrasive cutting machine is arranged for right-angle cutting of metals. An adaptor is available as extra equipment to provide for the cutting of any angle from 45° to 135°. The machine's capacity is the cutting of metals up to 2" x 2" solids, 3" standard pipe, 3" x 3" angle iron and 4" channels.

The unit is priced under $500.00.

Allison-Campbell Division, American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

Use postpaid card. Circle No. 110

Motorized Spindles Offer Assembly of Feeds



A completely redesigned line of precision motorized spindles in sizes from ½ hp to 10 hp is offered by the manufacturer. The design permits selective assembly of single or compound feeds to develop a composite unit of a motorized spindle with the preferred traverse.

Accessories include wheel holders, wheel guards for straight or cup wheels, mounting brackets, power cylinders, micrometer dials and accordion protectors.

The Cincinnati Electrical Tool Co., 375 Mt. Hope Ave., Cincinnati 4, Ohio.

Use postpaid card. Circle No. 111

Grinder-Polisher Gives More Throat Depth For Odd Parts

More throat depth for awkward shaped parts, as well as a small head for flexible belt and internal grinding, are advantages of the Model UBG-50. The two basic attachments include the

U-2 head on the right hand side and the U-1 on the left. The unit can be purchased with or without a built-in collector, and as single or double belt head units.

Belt sizes are 56" to 70" long, and ½" to 1" wide on the U-1 head. The U-2 head uses belts from 72" to 90" long, and 1" to 2½" wide.

Hammond Machinery Builders, Inc., 1651 Douglas Ave., Kalamazoo, Mich.

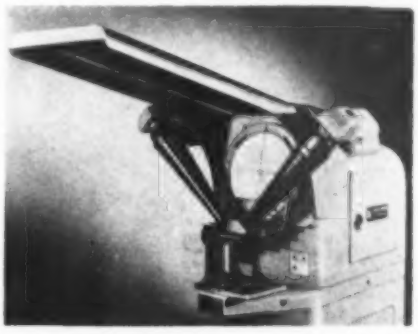
Use postpaid card. Circle No. 112

Optical Comparator Inspects Sections Without Cutting the Work Piece

The Jones and Lamson 14" optical section comparator, for inspecting edge contour sections, was developed to inspect the contours of the blade edges and the fairing between the edge contour and the foil contour.

The comparator incorporates two high intensity illuminating units which produce collimated light. The manually operated blade orienting fixture has an adjustable locating vee and built-in knife edge. Special orienting fixtures are available.

The collimated light is projected onto the blade held in the locating vee. The shadow is then inspected on the viewing screen, as a cross sectional view of the contour of the blade edge.



Jones & Lamson Machine Co., Springfield, Vt.

Use postpaid card. Circle No. 113

Don Oberg tells why the Moore Jig Grinder is an absolute must in any good die shop

by **DON E. OBERG**
General Manager
Oberg Manufacturing Co., Inc.
Tarentum, Pa.
Largest Manufacturer of Carbide Dies

"One of the most important features of an Oberg-built die is guaranteed complete and positive interchangeability of parts throughout the life of the die. *This feature would be practically impossible without the application of Moore Jig Grinders.*

"With Moore Jig Grinders we can accurately locate holes with relation to each other as well as size holes to extreme accuracies. We can efficiently grind contours on carbide die sections which would be impractical by almost any other method. Back taper on contoured carbide die sections and piercing holes can be readily generated on Moore Jig Grinders.

"We feel it would be *practically impossible* to produce the high precision carbide dies required by industry today without the Moore Jig Grinder. *In our opinion it is an absolute must in any better-than-average die shop.*"

As Mr. Oberg points out, the Moore Jig Grinder has no equal on many essential toolroom operations. If you would like a bulletin describing some of the features that make this machine so outstanding, just drop us a line.

MOORE SPECIAL TOOL COMPANY, INC.
725 Union Avenue, Bridgeport 7, Connecticut

"The things we like best about our four Moore Jig Grinders are the sturdiness and dependable long-life accuracy built into them. Ours are used ten hours or more every day. Even with this high activity, we have found no apparent inaccuracies from our oldest to our newest machine."

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. $5 in U. S. A., $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

Lapping Kit

The Lap-Rite Kit, for carbide finishing and sharpening, consists of a well-made mahogany box, six flat, semi-steel lapping plates, and a drawer with six compartments for keeping compound and all miscellaneous laps. Six jars of paint are furnished in colors specified.

The kit is priced at $75.00.

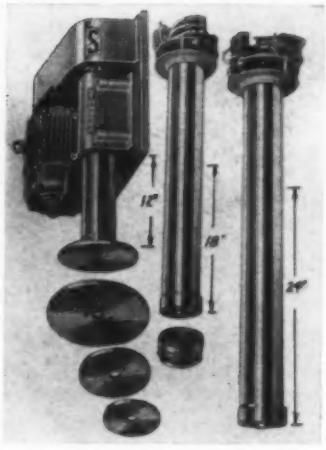
Starn Tool & Mfg. Co., State Road Hill, Meadville, Pa.

Use postpaid card. Circle No. 114

Super Precision Spindles

The great variations of the super precision spindles helps meet the problems of electrolytic metal removal. Direct motorized spindles serve 50, 75, 100, 150, 300, 1000, and 3000 amp. power units. Individual production problems are also served by self-contained belted motor driven units as illustrated.

In the illustration, each of the 12", 18" and 24" extension interchangeable spindles has a universal type of nose to accommodate backing plates for 6", 8", 10", 12", and 14" diameters of plate-mounted wheels for surface grinding, or independent wheel holders to accommodate wheels for peripheral grinding.



The spindles are said to deliver the maximum of precision in production, ranging from hypodermic needles, dental burrs, to heavy aircraft work in all thermal metals.

The Standard Electrical Tool Co., 2488-96 River Rd., Cincinnati 4, Ohio.

Use postpaid card. Circle No. 115

Optical Profile Grinder

A hydraulically controlled OPSM optical profile grinder built by Hommelwerke, Mannheim, Germany, is being distributed in the United States.

To operate the machine, the desired profile is drawn on a transparent plastic sheet to any selected enlarged scale between 10:1 and 50:1 and the drawing placed on a projection table. The projection screen shows in sharp focus a portion of the profile drawing, the corresponding section of the workpiece, the cutting edge of the grinding wheel, and the allowance for grinding.

The operator sees on the projection screen not only the grinding wheel, workpiece and drawing, but also a glass plate which is marked with a number of parallel lines, the direction of which exactly corresponds to the direction of the movement of the table. If the direction of feed has to be altered, only a movement of the plate is necessary. This is done by one steering wheel which rotates the plate, this rotation being observed on the projection screen.

Working surface of the projection table is 15x16½". The grinding range on the workpiece for one setting is 1.5" x 1.65" at 10:1 magnification, 0.3" x 0.33" at 50:1.

American Laubscher Corporation, 250 West 57th St., New York 19, N.Y.

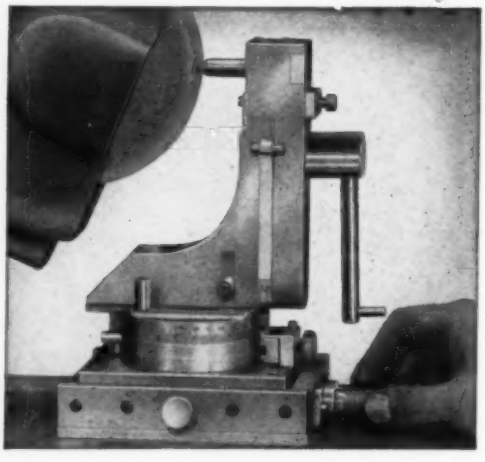
Use postpaid card. Circle No. 116

Tough Grinding Wheel Forms Dressed Easy as A, B, C

eliminate elaborate set-ups and operations

.0001" ACCURACY

Fluidmotion
WHEEL DRESSERS
dress two angles tangent to a radius in one continuous motion



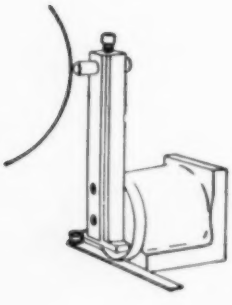
With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius — using one handle in one continuous motion. Operation is so fast and simple that beginners can use them.

Adaptable to all type cylindrical and surface grinders.

A. Obtain micrometer reading; add required convex radius or subtract required concave radius.

B. Loosen jib with wrench and "mike" over lower pins to reading obtained above.

C. Tighten jib. Set stops for two angles. Ready for action.



Also available: "FORM MASTER" Dresser, capable of dressing any radii up to 12" convex, up to 15" concave.

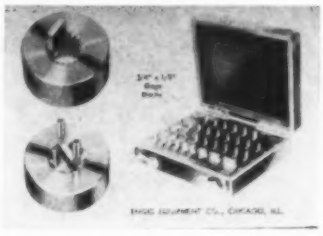
See your industrial distributor or write for free literature.

J&S TOOL CO. INC. — SAW CLAMPS · PRECISION VISES · BORE-HOLDING DEVICES

CLAMPCUT

J & S TOOL CO., INC.
880 DORSA AVE.
LIVINGSTON, NEW JERSEY

¾" x ⅛" Gage Blocks Measure Small Bores



A special set of gage blocks developed are adapted to high precision measurement of miniature and sub-miniature components, to measurement of chordal dimensions across serrations, the distance between cylinders located in serrations and splines, or the space width of straight splines.

Although only ¾" x ⅛", the gages are made to inspection quality and can be wrung together to form any combination between .1000" and 1.5000" in increments of .0001", according to the firm.

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

Use postpaid card. Circle No. 117

Fully Automatic Gear Hobbing Machine

A gear hobbing machine, the Koepfer 170, can be used for hobbing spur, helical and worm gears, worms, or any similar generated profile. It can be supplied with a magazine feed attachment providing fully automatic loading, chucking and machining. As a result, handling time is reduced considerably.

The machine can also be equipped with a manufacturing program control providing pre-selection by control switches for either longitudinal hobbing, plunge hobbing or combined plunge-longitudinal hobbing.

Cosa Corp., 405 Lexington Ave., New York 17, N.Y.

Use postpaid card. Circle No. 118

Electrolytic Chip Breaker And Cup Wheel Grinder

Model CME-6, a medium duty unit, is built with a 150 amp. Anocut Power Pack in the base, thus offering a compact, economical electrolytic grinding package.

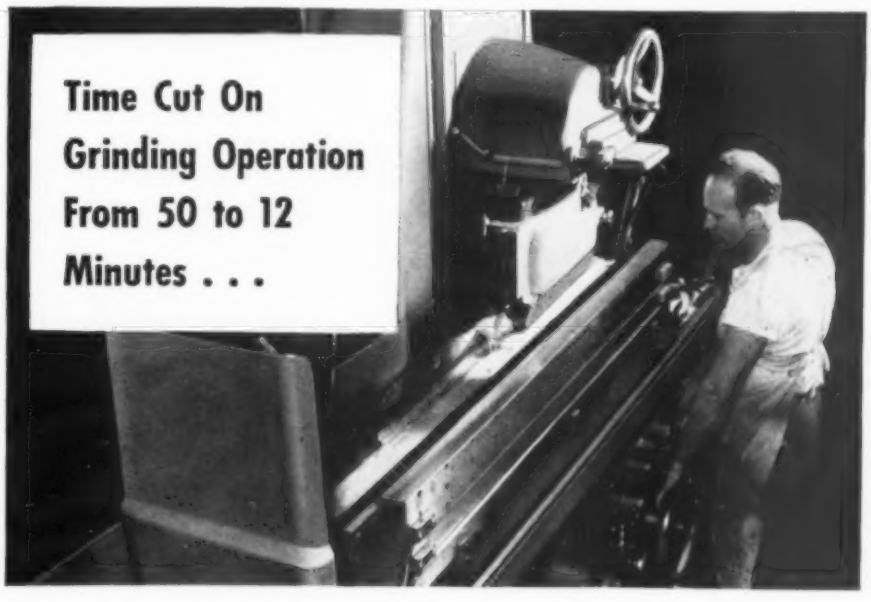
The main drive is a ¾ hp motor-on-spindle grinding head and has precision bearings. The complete spindle assembly is dynamically balanced for smooth operation. The grinding head is mounted on a large protected column which is aligned true with cam rollers in recessed ways. The table on the chip breaker side travels on ball bearing ways and has an 8" stroke.

Mist and fog are controlled by proper hooding of both ends of the machine and are drawn away by a Hammond MistKolector, which is included with the machine.

The carbide grinders are said to reduce consumption of diamonds 80 to 90%.

Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich.

Use postpaid card. Circle No. 119



With SUNDSTRAND "POWER-GRIP" Magnetic Chucks

Here's another good example of time savings with Sundstrand Magnetic Chucks. Two airplane flap tracks are held at one time for grinding on opposite faces of rail. Grinding stroke is 70 inches. Former time with conventional holding equipment was 50 minutes. With change to Sundstrand "Power-Grip" Chucks time is cut to 12 minutes . . . a savings of 38 minutes per part.

There's a good chance that you may be able to save considerable time in milling or grinding operations with Sundstrand "Power-Grip" Magnetic Chucks. Call in a Sundstrand Engineer. There is no obligation for this service.

Free Data is available on Sundstrand Clamping fixtures. Write today. Ask for bulletin 395-M.

SUNDSTRAND

POWER-GRIP

SUNDSTRAND MACHINE TOOL CO.
Magnetic Products Division
2531 ELEVENTH ST., ROCKFORD, ILLINOIS

NEW EQUIPMENT *continued*

Universal Chuck For Cylinder Grinding Wheels

The chuck automatically centers the grinding wheel with the spindle as the jaws of the chuck tighten against the grinding wheel. This feature eliminates off-center chatter and vibration in the spindle, according to the announcement.

Equal pressure is exerted on all jaws simultaneously, preventing overloading any jaw and preventing breakage of the grinding wheel. Jaws are tightened by turning a chuck key. This single action provides the changing of grinding wheels in a matter of seconds.

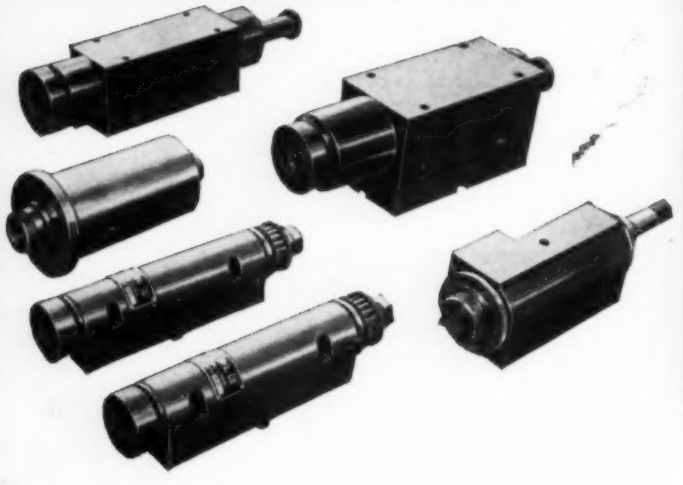
The sizes accommodate all standard wheels from 6" to 20" diameter.

Lindgren & Sons Machine, Inc., Chicopee Row, Groton, Mass.

Use postpaid card. Circle No. 120

accent on Accuracy!

Whitnon Boring Spindles



The efficiency of a Sextant depends on accuracy of manufacture

The accuracy of these spindles accents Whitnon's ability to provide precision spindle performance . . . for longer tool life and increased production.

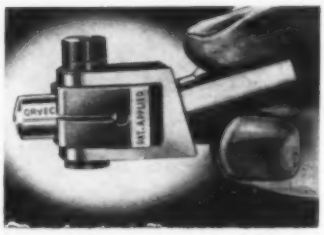
Whitnon Spindles are engineered for rigidity and machined to super-close tolerances . . . incorporating extra-capacity bearings and large alloy-hardened shafts to eliminate radial and axial deflection. Spring pre-loaded . . . grease lubricated . . . sealed for life . . . and dynamically balanced after assembly.

Designed and built by spindle specialists in one of the best equipped plants in the industry.

WRITE FOR LITERATURE TODAY.

THE Whitnon MANUFACTURING COMPANY
ROUTE 6 AND NEW BRITAIN AVE., FARMINGTON, CONNECTICUT

X-Ray Oriented Diamond Dressing and Trueing Tool



To make the Orvec diamond dressing and trueing tool, a slab of scientifically determined cross section is sawed from a high quality diamond. The slab is then accurately oriented by X-ray diffraction and is precisely transferred to the tool nib by fixtures, eliminating hand operations.

This technique orients the slab to its optimum wear resistance. It is also said to provide maximum tool life, give micro finish of parts, and more pieces between dressings.

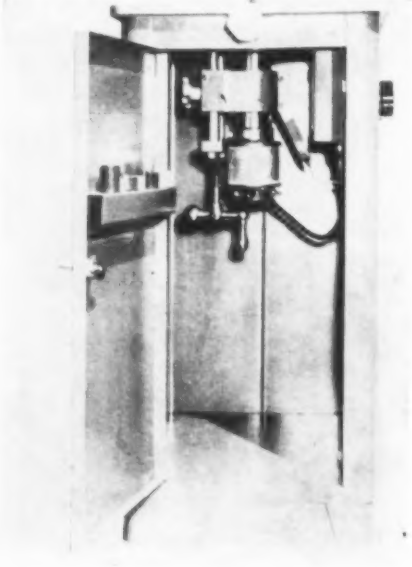
The tools are reported to never require resetting or turning, and dress and true evenly time after time.

Golconda Corp., 3418 N. Knox Ave., Chicago, Ill.

Use postpaid card. Circle No. 121

Profile Grinder Features Micro-Feed Guide Button

The Pruitt Profiler P-500 has a micro-feed guide button which is said to allow reproduction of contours to tolerances of .0005" automatically. The finger-tip speed control offers instant, precise speed settings from 100 to 45,000 rpm, according to the announcement. The routing, duplicating and grinding of metals, plastics, wood, glass or rubber is possible. Operations as template making, reproduction of parts from templates, and die sharpening become rapid and semi-automatic operations.



Larger models with ¾ hp and 1½ hp quills are available on special order.

Tool-Lab, Inc., Escondido, Calif.

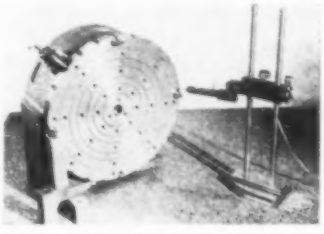
Use postpaid card. Circle No. 122

Combination Power Drilling And Checking Fixture

The M-M Check is not only a checking fixture, but can be used as a grinding fixture for grinding any combination of slots, squares, and hexagon. It qualifies as an accessory for a jig grinder, jig borer, for boring or drilling holes in plates on bolt circles 1, 2, 3, 4, 6, 8, 12, 24 combinations.

The Model S-24 is made for applications requiring less accuracy, with tolerances of .002. Model P-500 is designed to hold close tolerances of .0003 accuracy.

The device can be motor driven, or can be purchased without the motor and hand operated.



Model S-24 is priced at $290.00; Model P-500 $390.00.

M-M Tool Mfg. Co., Dayton 2, Ohio.

Use postpaid card. Circle No. 123

Expanding Mandrel Assures Accurate Hole Alignment

"Roll-Lock" expanding mandrel with built-up chucking surface used to obtain accurate alignment of speed reducer assembly.

"Roll-Lock" expanding mandrels with built-up chucking surfaces have been announced as a solution for aligning bores for drilling and reaming dowel pin holes during assembly of precision units, such as speed reducers, where cocking or twisting of the housings in final assembly cannot be permitted.

The expansion mandrel, which provides a .0015" expansion above the high limit from a diameter which is .0015" below the low limit, may be inserted in a through-shaft bore and the succeeding parts placed over it. Alignment of the head and frame assemblies is then obtained when the mandrel is tightened. Additional alignment may be obtained by the use of a ground plug in other shaft or similar holes that must also be aligned.

Scully-Jones & Co., 1924 S. Rockwell St., Chicago 8, Ill.

Use postpaid card. Circle No. 124

Rugged But Accurate Air Comparator Gage

The Air-O-Test, rugged enough for rough shop handling, is reported to give consistent readings in split-tenths of a thousand. The gage can be used on cylindrical grinders, boring machines, lathes, and surface grinders. It is priced under $100.

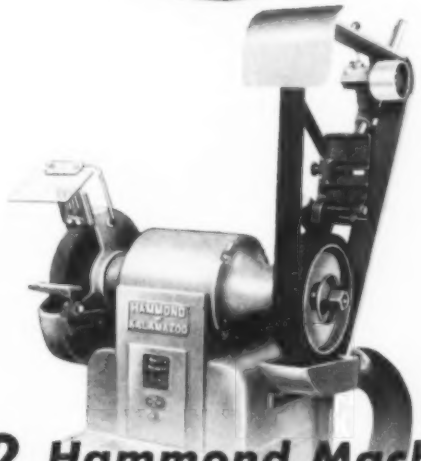
Information on how to make plug gages for air gage testing may be ob-

tained without charge. These can be made by any toolmaker in about three hours, using ordinary tool room machines.

Sperman Metal Specialties, 2199K E. 21st St., Brooklyn 29, N.Y.

Use postpaid card. Circle No. 125

WE TAKE OUR OWN MEDICINE!



202 Hammond Machines in use in our plant

- Abrasive Belt Grinders
- Carbide Tool Grinders
- Mist and Duskolectors
- No Dust–Wheel Grinders
- Polishing and Buffing Lathes

Every worker has power units nearby for fast grinding, polishing and deburring.

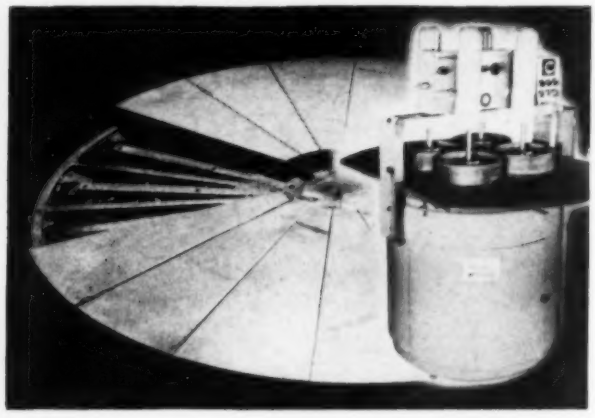
Write for catalog today

Hammond Machinery Builders INC.

1651 DOUGLAS AVE. KALAMAZOO, MICHIGAN

SEE US AT THE NATIONAL METAL EXPOSITION—BOOTH 1250—OCT. 27-31, CLEVELAND

Lapping Machine Offers Water-Cooled Base



On the Speedlap Model 32, an internally cooled lap base is effected by inducing a water flow in the casting la e under the lap segments; heat build-up through rapid metal removal is alleviated.

A number of para lel water passages are cored in the lap base. These are sealed by the lap plate segment, allowing the water to contact the back of the lap segment directly. A rotating joint in the hub allows free flow of water while the machine is running.

This system is said to allow the ultimate in stock removal from tough hard steels, alloys, and carbides, while eliminating distortion. Accuracies of fractional light band and surface finish of one rms can be obtained simultaneously with stock removal rates equal to grinding.

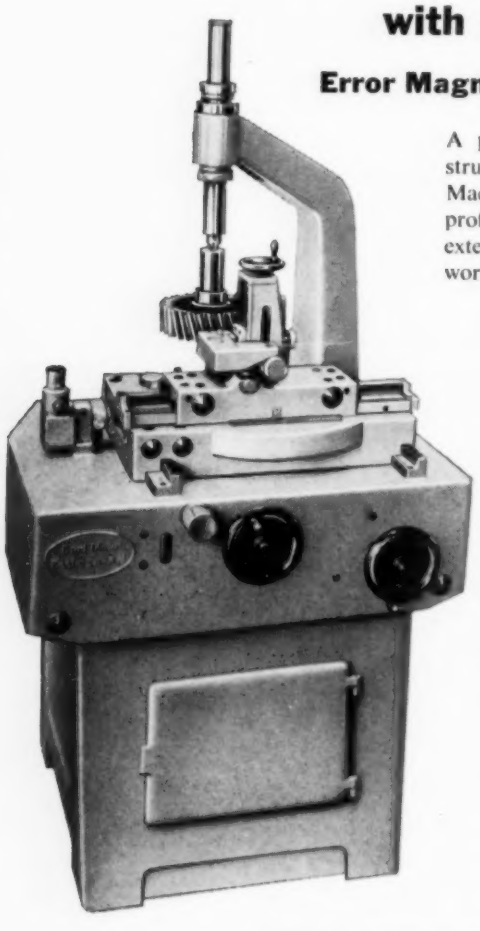
Lapping machine is shown superimposed on an enlarged view of the lapping table, showing parallel water passages.

Abrading Systems Co., 8020 N. Monticello, Skokie, Ill.

Use postpaid card. Circle No. 125

Check Involute Profiles On Gears From 0-20″ Dia. with a Mahr 890

Error Magnification 500 and 1000 X



A precision-built, highly sensitive instrument, the Mahr 890 Gear Checking Machine checks involute tooth flank profiles on spur and helical gears (both external and internal), bevel gears and worm gears.

Reduced Testing Time—provided by an infinitely variable, optical, base circle setting for gear diameters from 0-20″—with no need for base circle discs.

Accuracy—guaranteed by an extremely sensitive, shock-proof stylus and a recording magnification of 500 and 1000 X. Involute charts can be selected in ratios of 1:1, 2:1 and 4:1. Dust-protected, ball-bearing guides and chromium-plated guide ways assure smooth, low-friction operation.

Range—pitches from DP 1½ to DP 50 can be inspected with standard gaging points. Surface finish can also be checked and recorded easily with a knife-edge gaging point.

Write For More Information

COSA — *nationwide sales and service of precision machine tools —from bench lathes to boring mills.*

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

Transparent Coolant Provides Rust Protection

A chemical coolant for grinding operations, called Cooltex, is said to provide superior rust protection even in highly diluted solution, settles grinding dirt rapidly, and leaves no sticky film on machine surfaces to collect dust. It is transparent, giving the operator a full view of his work.

The product is designed primarily as a coolant, not a lubricant.

The Texas Co., 135 E. 42nd St., New York 17, N.Y.

Use postpaid card. Circle No. 126

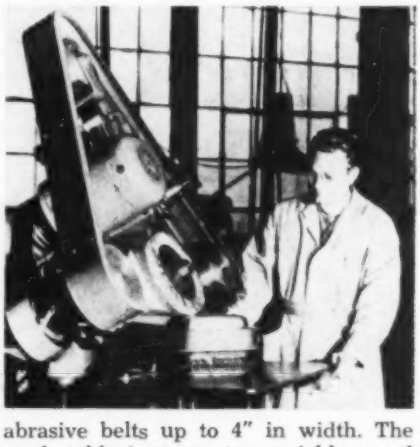
Contour Polishing Equipment

The equipment consists of the Model DLS abrasive belt head unit and the Job-O-Matic Jr. work table, which have been designed for polishing many contours in several planes. The abrasive belt head unit can perform both slack-belt operations and jobs requiring the backing up of the belt with a contact wheel or a platen.

A large spacing between the two idler pulleys on either side of the contact wheel permits the polishing of radical contours since the belt has more opportunity in which to retrack itself.

The work table can be used with many different types of head units and is available in various larger sizes and of heavier construction.

The belt head unit will accommodate motors up to 5 hp TEFC and 132″ length



abrasive belts up to 4″ in width. The work table incorporates variable speed drive (8 to 1 range), 24″ x 30″ (or

larger) table top and a ½ hp TENV motor.

Illustration shows operation being performed on a vegetable dish.

Divine Brothers Co., Seward Ave., Utica, N.Y.

Use postpaid card. Circle No. 127

Sintered Metal Tumbling Media

A scientifically designed type of metal tumbling media, available in shapes as triangles, discs and spurs in heat-treated steel and brass alloys, has exceptionally long life.

The sintering method of manufacture permits precise control of material hardness, shape, porosity and surface characteristics to provide media with the most desirable properties for particular cutting, deburring and finishing applications. The Dixon Sintaloy shapes can be impregnated with cutting, polishing or finishing compounds.

Sintaloy Factory, 535 Hope St., Stamford, Conn.

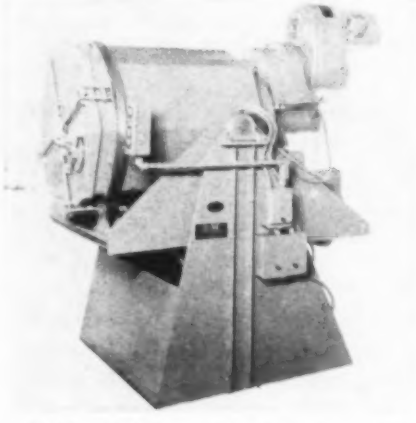
Use postpaid card. Circle No. 128

Barrel Finishing Machine Thoroughly Rinses Parts After Grinding

Model 30-34 HPT is a heavy duty finishing machine for grinding and burnishing parts, and can be operated dry as well as wet. Its primary feature is the thorough rinsing of parts after grinding and before burnishing.

Another feature is the self-aligning method of the barrel. The large spur gear (to which barrel is bolted), bearings, bearing housing, motor and motor pinion are all one integral unit free to align itself with the barrel in both the vertical and horizontal direction.

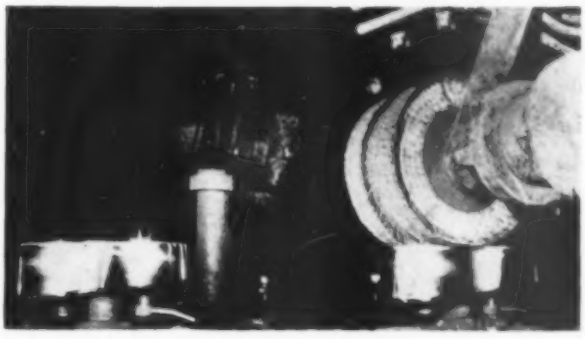
The total barrel capacity is 14.7 cu. ft., and the total load, 1500 to 2000 lbs. Variable speed is 6 to 30 rpm. Single speed is 29, 23, 19, 15, 12, or 10 rpm.



Globe Division, Casalbi Co., 540 Wayne St., Jackson, Mich.

Use postpaid card. Circle No. 129

Liquid Buffing Compound Speeds Parts to Anodizing



Shown in action is the Liquimatic spray system. Buffing headlight shells, with the system, are speeded to the anodizing cycle. Ordinary electro-cleaning removes traces of abrasive. Advantages of the liquid compound include limiting abrasive action to when the buff is in direct contact with the work and no loss of compound from breaking up.

Elements of the system are the air-operated pump in the compound reservoir, distribution lines and spray guns that deliver precisely-metered quantities of liquid spray.

Hanson-Van Winkle-Munning Co., Matawan, N.J.

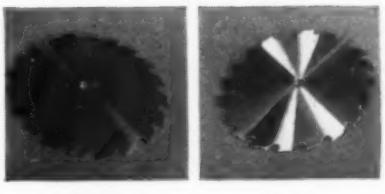
Use postpaid card. Circle No. 130

FOR HEINEMANN SAWS—

how HEINEMANN does it!

Saw blades are taken rough ground from surface grinders. They are placed on the magnetic rotating plate. The Brightboy Wheel oscillates back and forth across the surface of the saw.

"a mirror-like BRIGHTBOY Finish, unobtainable by any other form of polishing"



BEFORE AFTER

Heinemann Saw before and after Brightboy polish.

The FINISHING Touch!

"The eye-appeal provided by Brightboy's unique working action plays an important part in selling our saws", says Mr. William Heinemann of nationally-known Heinemann Saw Corporation, Canton, Ohio. "It produces the superb finish which reflects the high skill of our craftsmen and our use of finest materials."

FOR MANUFACTURE & MAINTENANCE OF MANY TYPES OF TOOLS

A Single-Step BURRING, FINISHING, CLEANING, POLISHING OPERATION

Brightboy's ABRASIVE & RUBBER work simultaneously to achieve this 4-in-1 operation. Stock Brightboy numbers are match-mated to the tool and steel for any requirement of finishing. A Brightboy finish frequently constitutes the final polish.

Readily Available: A WIDE RANGE OF STOCK BRIGHTBOY SHAPES, SIZES & TEXTURES

Wheels, sticks, rods and blocks for machine and manual operations come in Silicon Carbide and Aluminum Oxide grains from extra fine to extra coarse. Soft, firm, and tough rubber binders.

Practically limitless applications bring an entirely new, wider concept of abrasive uses. Ask your dealer for Brightboy's catalog listing grains, textures, applications, machine speeds. Write us if he cannot supply you or on any problem in which finishing is involved.

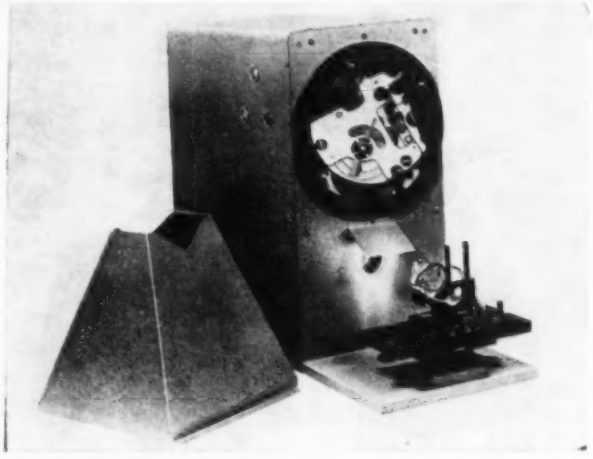
WELDON ROBERTS Brightboy RUBBER CUSHIONED ABRASIVES

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street Newark 7, N.J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

Production Comparators For Low Magnification In the 3x to 20x Range

Designed specifically for low magnification work in the 3x to 20x range, the projectors feature large area screens, distortion-free contour and surface images of brilliance and contrast. The large-capacity instruments make possible the inspection of sizable parts, components, and assemblies, with up to 3" field coverage at one time.

Protractor bezels, production holding fixtures, and micrometer measuring stages are available



accessories. Charts of grid, radii, protractor or thread patterns are obtainable in either the overlay or replacement type for higher magnifications, and special comparison charts may be made by the user's own drafting facilities.

The illustration shows a typical application set-up on the production holding fixture and the 3x image completely filling a 10" diameter ground glass screen.

Stocker & Yale, Inc., Marblehead, Mass.

Use postpaid card. Circle No. 131

Never before a honing machine like this new Model "AM" by Superior . . .

A new equipment that will help all plants shorten honing time, achieve a better finish on most types of metals, hard or soft, and realize much longer stone life.

Combines the rugged dependability and economical precision and speed which make it ideal for production runs, tool room work and salvage operations.

The only single machine which affords infinitely variable speeds of from 250 to 1400 rpm. Sealed ball bearing spindle. Tachometer permits accurate speed setting. Dial indicator available. Large disc clutch and disc brake

An exclusive feature is the 14-gallon capacity coolant tank which is removable for easy cleaning. Coolant tank, drive, and ½ H.P., 110-volt, 60 cy., single phase motor completely enclosed in heavy steel base which has louvered cover to provide ample ventilation.

Employs standard V-belt drive and provides automatic tensioning. The filter tray has three settling baffles and burlap filter. Overall size only 48" high, 28" wide and 36" deep. The top is formed into a convenient tray.

Universal adjustment of light. All on-off switches are mounted on the front of the machine for maximum convenience.

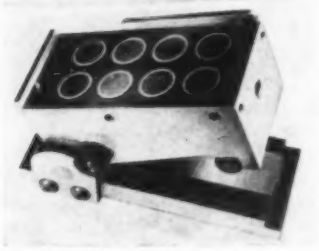
"You get so much more when you get Superior Honing Machines"

Send today to Honing Headquarters for literature and prices.

SUPERIOR HONE CORPORATION

1637 ELRENO STREET **ELKHART, INDIANA**

Magnetic 5" Sine Plate



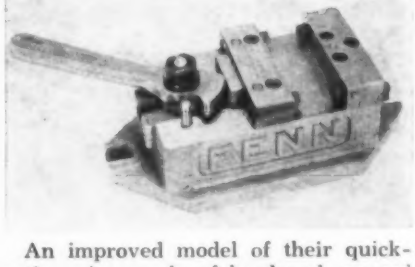
A 5" sine plate with built-in permanent magnetic chuck speeds light machining or inspecting of angles on small ferrous parts.

The 5" x 3" top surface provides ample working area. The permanent magnet holds a piece securely for light machining operations. The plate is available with or without a solid oak case.

Bald Eagle Corp., 356 Cedar St., St. Paul 1, Minn.

Use postpaid card. Circle No. 132

Improved Quick-Action Vise Has Quick-Action Cam Lever



An improved model of their quick-action vise, made of hardened, ground steel, has been developed by the Fenn Manufacturing Co. as a precision work-holding device for milling, drilling and assembly. The vise operates with a quick-action cam lever that opens or closes jaws instantly and uniformly. An eccentric handle then locks for a doubly secure grip.

The vise is obtainable in three sizes with openings of 3¼", 4-3/16", and 6-7/16".

The Fenn Manufacturing Co., Fenn Rd., Newington, Conn.

Use postpaid card. Circle No. 133

Boxed Buffing Wheel Display

A display contains Dico buffing wheels and compositions for buffing of all metals and plastics for do-it-yourself purposes. It comes with an easel

tray equipped with two protective, clear plastic box covers.

Each buffing wheel is individually boxed, complete with buffing manual of instructions, and a pair of toothed flanges to fit a ½" spindle. Extra pairs of toothed flanges to fit 1/4", 5/16", 3/8", 5/8", and ¾" spindles are included with each display at no extra charge. Toothed flanges to fit ½" spindle will be supplied with each wheel unless otherwise specified.

Each display contains eight assorted 4" wheels, 16 assorted 6" wheels, and 12 assorted compositions. The retail value is $28.50.

Divine Brothers Co., Seward Ave., Utica, N.Y.

Use postpaid card. Circle No. 134

Gear Checking Machine Offers Accurate Inspection

Reduced testing time on the Mahr 890 involute measuring machine is reported to be provided by an infinitely variable, optical, base circle setting for

gear diameters between 0 and 20"—without the need for base circle discs. This also permits the testing of very small gears and pinions. Accurate checking is said to be guaranteed by a highly sensitive, shock-proof stylus and a recording magnification of 500 and 1000x. Roll ratios are adjustable to 1:1, 2:1 and 4:1.

A holding device checks bevel gears. This unit can be swung through 105° (-15°, +90°) and is set with slip gage blocks. For inspection of internal gears an off-set stylus is used.

Surface finish of tooth flanks can also be checked and recorded easily with a knife-edge gaging point.

Cosa Corp., 405 Lexington Ave., New York 17, N.Y.

Use postpaid card. Circle No. 135

Do you use short cuts in your work? Do you have any kinks which would be helpful to the next fellow? Send them to GRINDING and FINISHING for publication. All material is paid for! Material can be in your own words, drawings can be rough pencil sketches; our editorial and art departments will do the rest. Send your Hints and Kinks to: Editor, GRINDING and FINISHING, 222 E. Willow Ave., Wheaton, Ill.

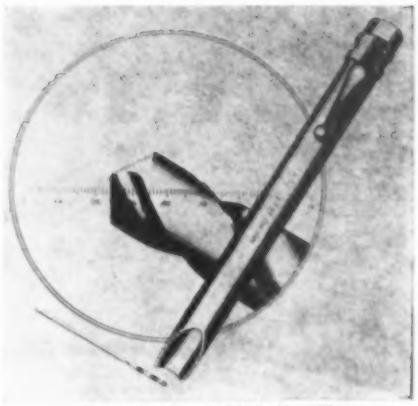
Pocket-Size Measuring Microscope

The Micro-Mike, a twenty-power pocket-size inspection and measuring microscope, is said to provide a flat, undistorted field. The superimposed scale, with .002" graduations, is internal and cannot be scratched or smeared.

The instrument is designed for the inspection and measurement of tiny parts, as well as measurement of fine lines, screens, meshes, fabrics, and other surfaces.

The microscope is priced at $4.95. Without scale, it is available at $2.95.

DuMaurier Co., Elmira, N.Y.

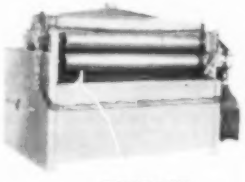


Use postpaid card. Circle No. 136

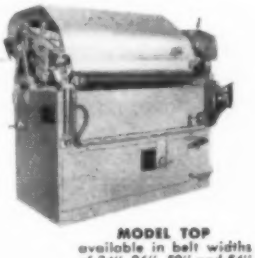
"Only machine capable of handling our rugged and precision sanding requirements on large aluminum panels"*

*Reported by
N. B. Barsha, Plant Engineer
Cupples Products Corp.
St. Louis, Mo.

TIMESAVER SPEEDBELT SANDERS



MODEL SPL
available in belt widths of 24", 36" and 50". Sanding action is for underside of work.



MODEL TOP
available in belt widths of 24", 36", 50" and 54". Sanding action is overhead.

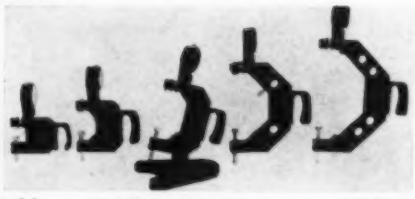
"We were faced with the problem of sanding 1000 vertical aluminum panels, 28"x24"x3/16" for the exterior of the new U.S. Air Force Academy buildings. These panels required finishing to a uniform and precision surface specification. Before we purchased the Timesaver Model TOP-50, we thoroughly investigated the market for sanding machines of this type. The Timesaver "Speedbelt" was the only unit which possessed the durability, accuracy and rugged construction necessary for our requirements."

The Cupples Products Corporation's experience is typical of Timesaver "Speedbelt" Installations throughout the country . . . where performance and need to achieve production and cut costs is important. They can do all flat metal surface finishing, polishing and sanding formerly assigned to other methods . . . and do them better. What's more, savings made in labor, materials and maintenance soon pay for their low initial cost.

Investigate the advantages of Timesaver Sanders for your plant, write for literature and information today.

TIMESAVER SANDERS
P.O. Box 7446, Robbinsdale Station • Minneapolis 22, Minn.
Pioneers in Wide Belt Sanding for the Woodworking Industry

New Dial Snap Gage Series



Five models of this dial snap gage series cover the range from 0 to 8". The lightweight rugged gages make use of a reed linkage transfer.

Some of the features include carbide faced anvils, adjustable backstop, stainless steel bushing in the lower anvil, Boice Stabalock parallel locking mechanism, and the Boice gearless indicator graduated in .0001.

The gages are available in two series—flat and parallel anvil and spherical upper anvil types.

Boice Gages, Inc., Hyde Park, N.Y.

Use postpaid card. Circle No. 137

Ultrasonic Cleaning Unit

A low-priced ultrasonic cleaning unit is designed for the cleaning of small parts.

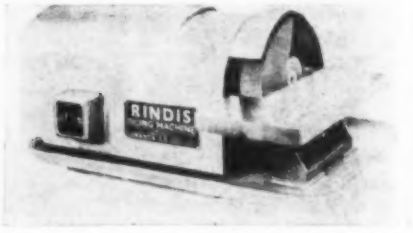
The Econo-Sonic is a complete solvent degreasing unit within itself. It has boil and rinse chambers, plus complete circulation and filtration. Included in the package is a 110 volt, 600 watt, 400 KC Detrex generator.

Detrex Chemical Industries, Inc., 14331 Woodrow Wilson Ave., P.O. Box 501, Detroit 32, Mich.

Use postpaid card. Circle No. 138

Power Disc Filing Machine

The Rindis power filing machine is reported to remove material four to six times faster than by hand filing without



the use of expensive abrasives or lubricants. It is designed for filing, trimming and deburring a wide variety of small components as mouldings, pressings, metal and wooden patterns.

Filing and trimming by disc and ring is said to eliminate the need for costly set-ups on milling and grinding machines. Various teeth arrangements can be used at different speeds. The discs retain their shape without redressing, and need no coolants.

Newage Industries, Inc., 222A York Rd., Jenkintown, Pa.

Use postpaid card. Circle No. 139

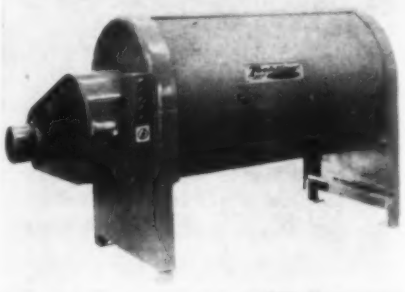
Barrel Finishing Equipment Has Vibration-Free Operation

Vibration-free operation is said to characterize the Techline Model 30 series of precision barrel finishing equipment.

A model fiberglass safety gate is corrosion-proof and lightweight for easy operation. Safety controls to prevent the machine from operating with the gate open except for jogging, and a fiberglass housing which guards the entire drive mechanism are also featured.

The machines are offered in 20 models ranging from 5 to 30 cu. ft. capacity, and having one to six separate compartments, designed for both wet and dry processes.

Standard cylinders are lined with ¼" calendered Neoprene; other linings include ¼" rubber, and ½", ⅜" or ¼" rubber or Neoprene, and ¼" steel plate.



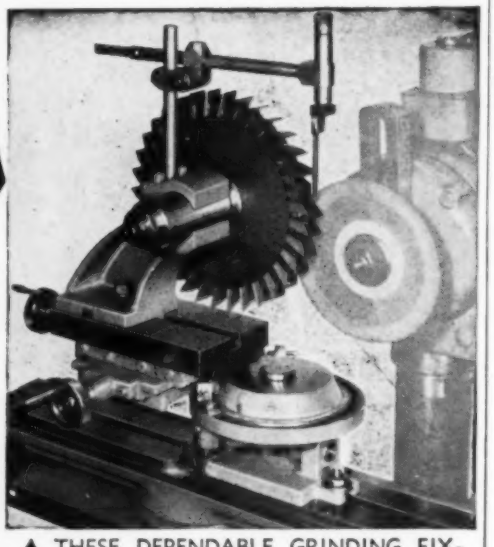
Techline Division of Wheelabrator Corp., 1169 Avenue V, Vicksburg, Mich.

Use postpaid card. Circle No. 140

THE UNIVERSAL RADIAL CUTTER GRINDING FIXTURE

Does 5 Operations without removing cutter from its ARBOR!

On cutters up to 8" in diameter, the No. 6 fixture, as shown with our No. 6A heavy-duty, right-angle, ballbearing spindle workhead:
Sharpens side teeth on **both** sides.
Sharpens peripheral teeth.
Generates small or large radii on **both** corners of each tooth.
(Other workheads available)

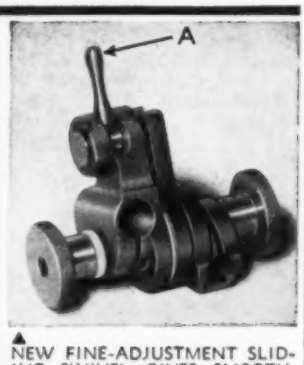


▲ THESE DEPENDABLE GRINDING FIXTURES SAVE THE LIFE OF YOUR CUTTERS. Write for our catalog 603

◀ UNIT 1A
This Universal Cutter Grinding Fixture fits any universal tool or surface grinder.

Radial Grinding Attachment D combines with Unit 1A for sharpening end mills with square, conical, or ball nose shapes. ▼

▲ UNIT 4A
Radial Grinding Fixture for sharpening fluted end mills with square, conical, or ball-nose mills. The index disc provides for multi-flute cutters.



▲ NEW FINE-ADJUSTMENT SLIDING SWIVEL GIVES SMOOTH, PRECISE INDICATOR SETTING. Smooth, positive positioning of finest dial indicator is readily accomplished by the fine-adjustment Sliding Swivel. Final precise positioning is accurately made by slight movement of convenient lever "A".
WRITE FOR:
SLIDING SWIVEL FOLDER

ROCHELEAU TOOL & DIE CO.
650 North Main St., Leominster 1, Mass.

Please Mention GRINDING & FINISHING when writing to Advertisers

Eddy Current Instrument For Crack Detection and Sorting

The Magnatest ED-500 locates defects in all conductive materials. It also sorts mixed lots of ferrous and non-ferrous metals for differences in hardness, alloy, and heat treat condition, and measures the thickness of certain conductive and non-conductive coatings on conductive bases.

The instrument consists of an indicating unit, inspection probe, and power line cord. As the probe passes over a crack or metallurgical difference, an unbalance occurs which is indicated by a needle deflection on a meter. With a lift-off adjustment feature, the meter can tolerate intermediate layers of dirt, oxide, and pits, up to a thickness of .020".

Price of the instrument is $810.00, f.o.b. Chicago.

Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill.

Use postpaid card. Circle No. 141

Portable Dehumidifier

The Suttle Atmo-Dry portable room dehumidifier removes two to three gallons of water from the atmosphere every 24 hours. It is designed to solve the problem of excess moisture, mildew prevention, or equipment protection from excessive humidity.

The dehumidifier contains a removable rustproof drawer which can be easily emptied, or a permanent drain requiring no attention can be installed.

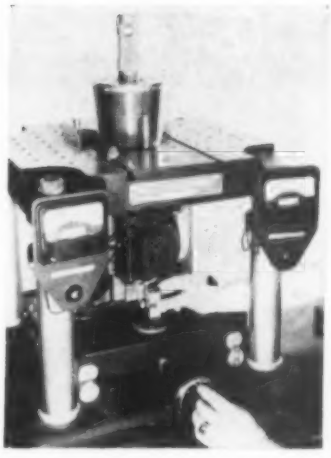
Suttle Equipment Corp., 135 S. LaSalle St., Chicago 3, Ill.

Use postpaid card. Circle No. 142

Tester Checks External And Internal Threads For Lead and Taper

The Model A electro-mechanical universal lead tester is said to be able to check internal threads ranging from 1¼" to 16" diameter, and external threads from 0" to 16", on work as heavy as 500 lbs. The unit was designed to meet the demand for checking the lead and taper of API gages, which were often too large or too heavy for checking between centers or mounted on V blocks.

The lead tester combines the ability to check the lead of straight or taper threads, internal or external threads, and taper of threads or cylinders. Direct readings are made to .00002" for lead, and to .0001" for taper by means of the Electrolimit gaging principle incorporated in the gaging machine.



Pratt & Whitney Co., Inc., West Hartford 1, Conn.

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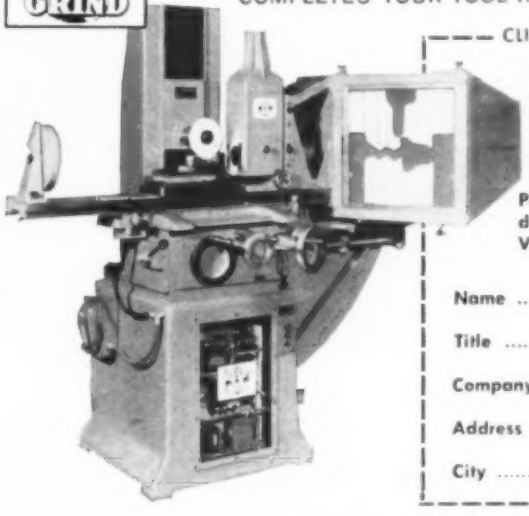
ARE YOU CONTOUR GRINDING PUNCH and DIE SECTIONS?....

FREE "VISUAL GRIND" BOOKLET SOLVES YOUR PROBLEMS: IMPORTANT TO YOU. Free booklet tells how VISUAL GRIND facilitates contour grinding of carbide or steel, punch and die sections, dies for powder metallurgy, lamination dies and special purpose dies. VISUAL GRIND permits through, blind and templet grinding . . . permits continuous inspection by magnifying work from 10:1 to 100:1 . . . upgrades semi-skilled labor . . . permits easy maintenance of dies in your own plant . . . reduces costly down time. VISUAL GRIND COMPLETES YOUR TOOL ROOM.

VISUAL GRIND



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Please send me the free brochure describing the capabilities of VISUAL GRIND.

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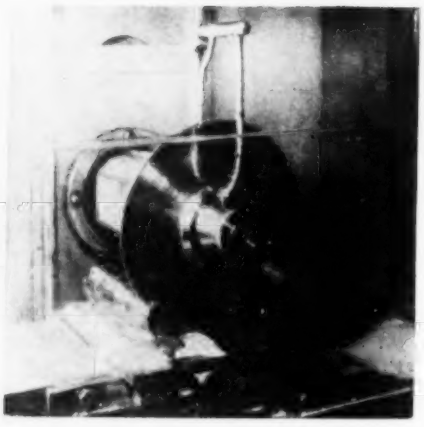


Diamond Cutting Wheels

Manufactured by a new process, diamond cut-off wheels, called Diatronic, are reported to cut fully-hardened steels, silicon and germanium crystal, glass tubing, tungsten carbide, etc., with great accuracy. The wheels, .006" x 3", are said to have rim tolerances of plus .0005", minus 0.

Illustration shows the wheel with guard removed.

Navan Products, Inc., 900 N. Sepulveda at Imperial, International Airport, Los Angeles 45, Calif.

Use postpaid card. Circle No. 144

BIG MACHINE PERFORMANCE.....

SMALL MACHINE COST!

BOYAR-SCHULTZ

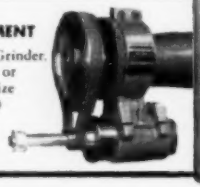
6☆12

surface grinder

MORE THAN THIRTY YEARS experience in machine design has gone into the development of this Boyar-Schultz 6-12 Surface Grinder. It has the stability and the accuracy usually found only in larger and more costly grinders. It is truly a grinder that will give Big Machine Performance at Small Machine Cost.

HIGH SPEED GRINDING ATTACHMENT

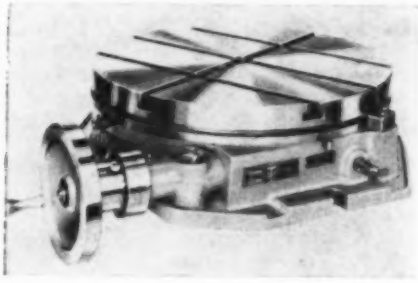
Get more from your Surface Grinder. Designed for grinding angles or slots too small for standard size wheels. Spindle speed is 14,000 R.P.M. Mounts on regular surface grinder spindle. Prices on request.



Boyar-Schultz CORPORATION

2002 SOUTH 25th AVENUE • BROADVIEW, ILLINOIS

Redesigned Rotary Tables



The Troyke rotary table line has been redesigned for cutting segments of circles and circular slots, milling clutch teeth, locating angularly spaced holes or slots, cutting irregular contours, etc. The total guaranteed accuracy is reported as 60 seconds or less.

Featured are larger diameter, easy-to-read dials which are accurately graduated in one minute increments, precision ground turn-tables accurately graduated in one degree increments, and coolant troughs on larger models.

The rotary tables are available in six diameters ranging from 9" to 25", and eight different models. Dividing attachments are also available.

The Troyke Manufacturing Co., Cincinnati 41, Ohio.

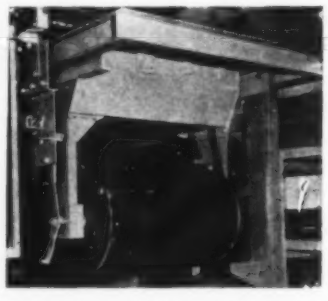
Use postpaid card. Circle No. 145

Processing Barrel Opens, Closes Automatically

A metal processing barrel has a barrel door that opens and closes fully automatically. The barrel is particularly adaptable to integration into automated systems for a wide variety of metal processing operations. For instance, it is adaptable to automatic hopper feeding and automatic unloading to hoppers or conveyor belts.

The barrel is designed for cleaning, phosphating, blackening, Lubrite, Bonderizing, chromate treatments, pickling, and similar processing.

Illustrated is the fully automated,



straight-line machine, with automatic opening-closing mechanism seen at left.

Hanson-Van Winkle-Munning Co., Church St., Matawan, N.J.

Use postpaid card. Circle No. 146

T-Slot Cleaner

The Kelm T-slot cleaner protects accuracy of the precision T-slots and speeds set-ups. One end cleans clogged T-slots and the other spoons out chips in pockets at the end of the machine table.

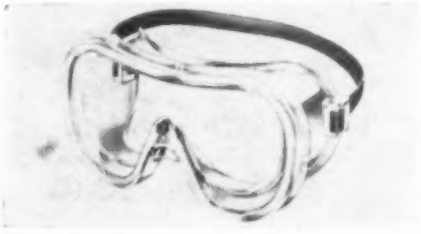
The tool is priced at $1.25, with liberal quantity discounts.

Otto Kelm, R.R. 2, Coloma, Mich.

Use postpaid card. Circle No. 147

Splash-Resistant Chemical Goggle

The safety goggle is indirectly ventilated—no vents in frame or holes in lens for splash-resistant safety. It is also fog-free. The goggle frame is molded from non-irritating and non-toxic vinylite plastic.



The goggle is particularly recommended for use in the chemical industry and where humid conditions prevail.

American Optical Co., Safety Products Division, Southbridge, Mass.

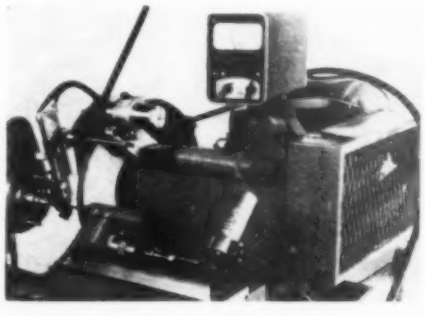
Use postpaid card. Circle No. 148

Do-It-Yourself Automation

Standard electronic attachments, consisting of a basic console and reading indicator with other plug-in accessories, can be used for centerless grinding, strip-chart recording, control of taper, etc.

The chief advantage claimed for the Electro-Autosizer is that it works on electronic capacitance. It therefore requires no air line connections or extra gages to calibrate air pressure or control air moisture. It is unaffected by temperature changes, according to the firm.

Illustrated is "autopairing" in process.



Electro-Autosizing Machine Corp., 130 William St., Closter, N.J.

Use postpaid card. Circle No. 149

Line Type Hydraulic Filter

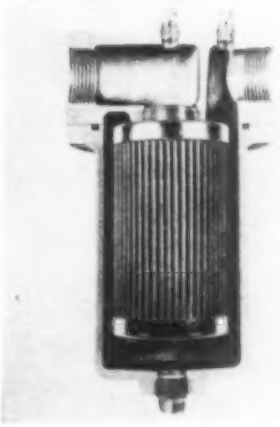
A line type filter, applicable to requirements of operating pressures up to 150 psi at temperatures up to 300° F, offers efficient filtration of hydraulic oils, fire-resistant fluids, coolants, and lubricants, according to the firm.

The filters are now produced in 10, 20, 30, 50 and 75 gpm capacity sizes, with choice of Monel wire cloth mesh sizes from 30 to 100. All units are available with or without by-pass valve.

All units are easily disassembled for thorough cleaning.

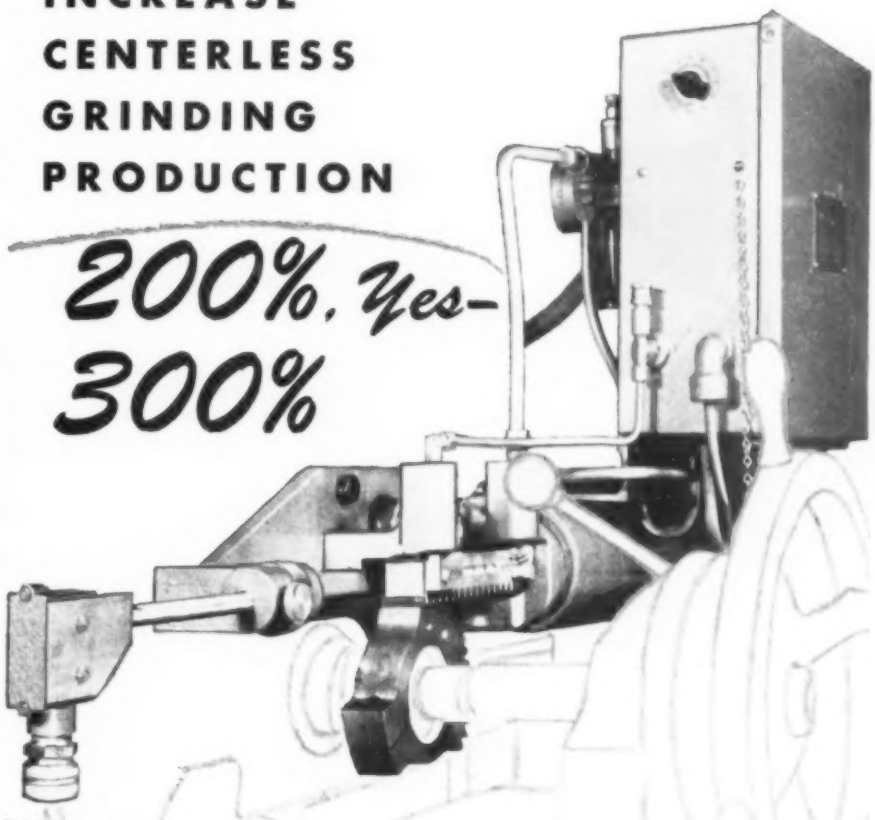
Marvel Engineering Co., 7227 N. Hamlin Ave., Chicago 45, Ill.

Use postpaid card. Circle No. 150



INCREASE CENTERLESS GRINDING PRODUCTION

200%, Yes— 300%



WITH THIS NEW AUTOMATIC INFEED GRINDING ATTACHMENT

Utmost precision in grinding and duplicate sizing. Sizing dial is graduated in (.00001) one hundredth of a thousandth of an inch. No hydrocheck to change feed rate when oil is cold. No checking of oil level or refilling of hydrocheck. Three (3) different feed rates are available in one unit for the fastest, most efficient, and precise sizing in a centerless grinder.

CAN BE USED FOR TRU-FEED AS WELL AS INFEED

for close sizing. Ideally located push button control station consists of Stop-Button, Start-Button, Caution Pilot Light, and a selector switch for set up or auto grinding positions. CATALOG Write for it today!

MODERN DEVICES

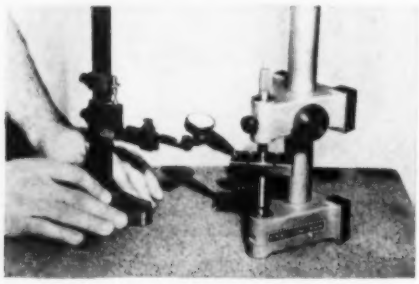
Subsidiary of TWENTIETH CENTURY MFG. CO.

FEEDCISION

Box 429 GF Libertyville, Illinois

Open Territories for Manufacturers' Representatives

Miniature Bench Center For Inspecting Small Parts



An instrument type bench center, for use in inspecting miniature parts which are machined on centers, is a precision device for checking concentricity, run-out and squareness of face to axis, or outside diameter of the miniature and sub-miniature parts and components now used in missile, electronic and aviation assemblies.

The No. 9205M bench center has a self-aligning shaft which sets the workpiece in place quickly and accurately by loosening a single locking knob and sliding the tailstock along the aligning shaft. When the tailstock locking knob is tightened, the centers line up automatically.

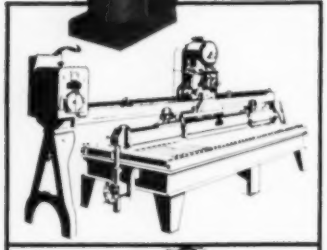
The portable unit sets up quickly to handle work up to 8" long x 3" diameter.

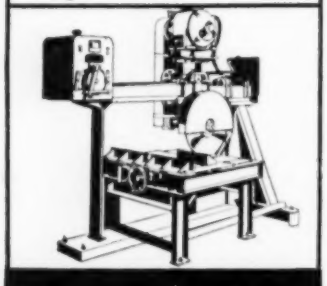
The Taft-Peirce Manufacturing Co., Woonsocket, R.I.

Use postpaid card. Circle No. 151

HIGH-SPEED SAW WITH CLAMP TABLE MAKES IRREGULAR SHAPE CUTS

WRITE FOR FREE CATALOG





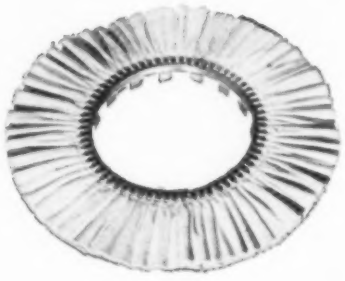
LOW INVESTMENT SAW CUTS METAL FAST & CLEAN

Whether you're making straight cuts, odd angle cuts or irregular shapes such as turbine impeller blades, you'll find the Ty-Sa-Man 144 BD combination of speed and amazing accuracy will save you money. Table has positive air-driven clamps to hold material in any position. Other Ty-Sa-Man cut-off models from 10" to 58" cuts . . . long-cut saws for 4' to 60' cuts, with or without cross movement, for friction or abrasive sawing.

Ty-Sa-Man MACHINE COMPANY

1016 WHITE AVENUE, KNOXVILLE, TENN.

Buffing Treatment Steps Up Buffing Flexibility



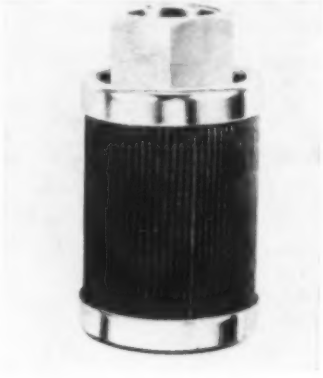
The 8108 buffing treatment, which can be applied on any type of cotton or sisal buff, lubricates and softens the material for flexibility. After treatment the buff easily penetrates narrow grooves and follows curves and contours. By fusing with the buffing compound, the 8108 treatment, which has a slightly adhesive texture, retains the buffing compound longer, according to the firm.

American Buff Co., 2414 S. La Salle St., Chicago 16, Ill.

Use postpaid card. Circle No. 152

Filter Used With Water Will Not Corrode Or Rust

The Capital 60 mesh Mono-Bilt sump type filter, being made of stainless steel, will not corrode, rust or deteriorate when used with any hydraulic liquid and water. Its small size makes it adaptable for use in small spaces. There are no washers, screws, gaskets or loose parts to lose or be replaced.



The filter is available in seven sizes with capacities from 5 gpm to 125 gpm. Sizes cover ¾" to 3" pipe diameters.

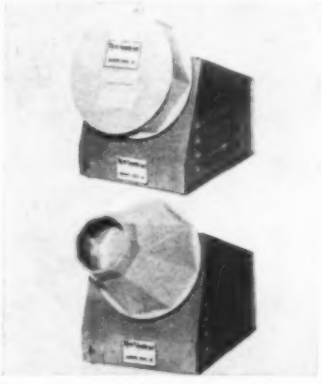
Capital Engineering & Mfg. Corp., 5837 So. Ashland Ave., Chicago 36, Ill.

Use postpaid card. Circle No. 153

Portable Bench Tumbler For Small Parts

The Rampe Mini-Tumbler, designed for portable use in tumble finishing of small parts, features a 24-52 rpm variable speed drive for added flex-

ibility. The one-gallon capacity is available in either open conical or closed



hexagonal burring barrel, both protected with orange no-seam vinyl plastic lining.

Typical uses of the tumbler include continuous duty finishing work in screw machine work, instrument shops, foundries and plating shops, as well as in laboratories, electronics manufacturing and lapidary work.

The unit sells for about $135.00.

Rampe Manufacturing Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Use postpaid card. Circle No. 154

Vacuum Pump Features Oil-Free Operation

Model 033612, designed as a replacement for the Pesco Model 3P194 vacuum pump, requires no lubrication and discharges absolutely oil-free air, according to the announcement. The pump is applicable to all light aircraft equipped with vacuum instrumentation.

Reductions in installed weight are reported up to 25%.

Pesco Products Div., Borg-Warner Corp., Bedford, Ohio.

Use postpaid card. Circle No. 155

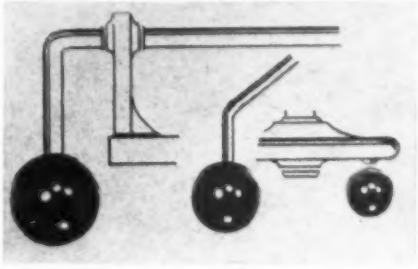
YOUR QUESTIONS ANSWERED!

Send your questions and problems to GRINDING and FINISHING. Your problems may be similar to many others so let's get them out in the open. Our new question and answer section will attempt to answer the bothersome detail problems as well as the major difficulties. Please include all the facts involved in your question.

Plastic Ball Lever Knobs

Used as knobs on clutches, gears, and levers on machine tools, the plastic balls are good thermal insulators, and have good resistance to heat and flame.

The plastic balls are available in three O.D. diameters: 2", 1⅜", and 1". The 2" size is available with ½" or ⅝" tapped steel insert; the 1⅜" size has a ⅜" tapped brass insert, and the 1" size has a ¼" tapped hole.



Jergens Tool Specialty Co., 712 E. 163 St., Cleveland, Ohio.

Use postpaid card. Circle No. 156

Steam Generator Delivers Steam in 45 Seconds

A line of steam generators uses a new method of vaporization—the units deliver over 30 lb. of steam per BHP (boiler horsepower) per hour. Standard model generators are available in capacities from 1 to 5 BHP and in special models of higher capacity.

The units are portable. Power requirements are 3-phase, 220 V, AC.

Lectro-Heat Products Corp., 12084 Woodbine, Detroit 39, Mich.

Use postpaid card. Circle No. 157

"most used grinder" say customers

WET or DRY Model MG

In checking with the tool, die, gage and general production shops that use SANFORD SURFACE GRINDERS, the most frequent comment was that Sanford Grinders were the "most used" of any grinders in the shop.

PARTIAL SPECIFICATIONS—

Capacity — 8" x 12" x 12".
Table travel — 13", traverse 8¾".
Vertical clearance 12" under 7" wheel.
Standard grinding wheel — 7" x ½", 1¼" hole.
Spindle speed approx. 3000 RPM.
Motor, ½ HP, single or 3 ph., dynamically balanced.
Floor space — 45" x 38" x 62" high.
Net wt. with stand approx. 630 lbs.

Others have tried to copy but there's a "feel" that comes from the precise individual quality and workmanship that goes into every SANFORD GRINDER. It's the factor that can't be found in any other grinder.

So widely used you can ask users in your own area how they like the low priced Sanford Surface Grinder.

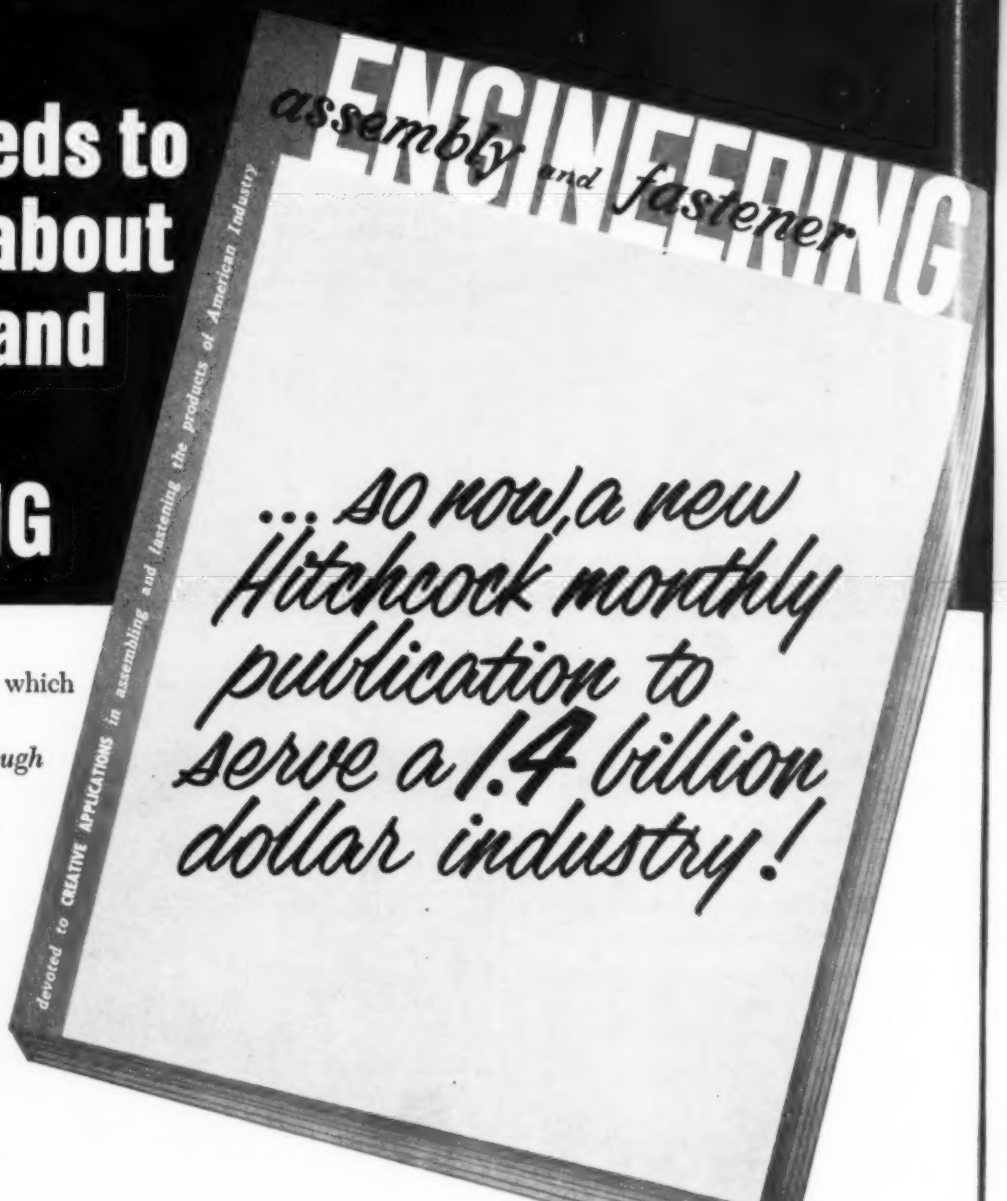
Write for illustrated and fully descriptive literature, reconditioning facilities, optional equipment and prices.

Representatives in major industrial areas

SANFORD MANUFACTURING CORP.
1026G Commerce Ave., Union, N. J.

A Hitchcock conclusion:

Industry needs to know more about ASSEMBLY and FASTENER ENGINEERING


assembly and fastener
ENGINEERING
devoted to CREATIVE APPLICATIONS in assembling and fastening the products of American Industry
... so now, a new Hitchcock monthly publication to serve a 1.4 billion dollar industry!

Three years ago your men from Hitchcock started a conversation which ran something like this:

Everything from automobiles through zithers have to be held together.

How much of the cost of making things is devoted to their assembly and fastening?

How many manufacturers use a creatively engineered fastener for their specific application?

How many buy fasteners on the basis of assembly cost and not on piece-part cost?

In short, what steps have manufacturers taken to reduce their assembly and fastening costs?

The seed had been planted . . . Hitchcock had been noticing that the field of assembly and fastening throughout industry had been virtually ignored.
After three years of study and research, the idea germinated into a few basic premises . . .

- **50-75% of total manufacturing cost goes into assembly and fastening operations.**
- **There are several ways to reduce this cost.**
- **Industry should be shown HOW.**
- **There is no publication at present devoted to the little-noticed field of assembly and fastening.**

The Hitchcock conclusion: a new monthly publication—ASSEMBLY and FASTENER ENGINEERING—to reach every major portion of this $1,400,000,000.00 market. To stress creative applications . . . discuss new methods . . . to EDUCATE MANUFACTURERS in decreasing assembly and fastening costs, in increasing profits.

CIRCULATION: in excess of 25,000 copies at the outset.
READERS: on the engineering level; will include design, process, method, production, manufacturing and standards engineers.
FIRST ISSUE: October 1958.

Plan now to advertise in the ONLY publication which can and will serve the important and growing assembly and fastener market. Write, telephone, or wire for further facts on ASSEMBLY AND FASTENER ENGINEERING.

METALWORKING

Machine & Tool Blue Book
Machine & Tool Directory
Grinding and Finishing
Carbide Engineering

WOODWORKING

Hitchcock's Wood Working
Hitchcock's Wood Working Directory

TRANSPORTATION

Mass Transportation
Mass Transportation's Directory
School Bus Trends

hitchcock
PUBLISHING COMPANY
WHEATON, ILLINOIS
SINCE 1898

THE PIONEER OF CONTROLLED CIRCULATION

News of Industry

Size Control Offers New Jig Boring & Grinding Facilities

New facilities for jig boring and jig grinding to extreme accuracies have been announced at Size Control Co., Chicago. Its jig boring and jig grinding machines in working areas rigidly controlled as to moisture, dust and temperature will provide high precision work to tolerances as close as .00005" on gages, piece parts and fixtures, according to the firm.

These jig boring and jig grinding machines are kept in areas rigidly controlled as to temperature, moisture and dust. The room closely duplicates the requirements specified by the U.S. Bureau of Standards.

E. E. Olds, Size Control Sales Manager, says the new precision jig boring and jig grinding services can guarantee manufacturers in such fields as aviation or missiles and rocketry accuracies in piece parts to .0001 of an inch under normal conditions and as close as .00005 of an inch in special situations. These extreme accuracies are available in small lot quantities for research and development work and prototype operations.

Special electronic gages are used to check accuracies that are later certified by The Midwest Gage Laboratory as to tolerances and dimensions.

Carbo Starts New Falls Plant

Construction has been started on The Carborundum Company's new plant facilities in Niagara Falls, New York, for the manufacture of 4" to 14" grinding wheels, estimated to cost approximately six million dollars, according to an announcement by General Clinton F. Robinson, president of the company.

The new plant facilities were authorized by the Board of Directors of the company, General Robinson said, upon confirmation that Local 15-12058 OCAW-CIO had agreed to new contract provisions between the company and the union which make it practical for the company to invest substantial capital in the Niagara Falls area.

The new plant will incorporate the results of over two years of engineering development. Although the plant will not be fully automatic, it will feature important specially designed automatic and semi-automatic equipment.

When the new plant is in operation, abrasive grains and bonds are weighed automatically according to order specifications. After being mixed under punch card controls, the material goes to pre-mix storage. As production control requires, the "pre-mix" moves to automatic pre-set presses by special handling equipment. After forming, the pressed wheels are placed on kiln tile with special equipment and readied for the kiln run as scheduled. Fed into continuous tunnel kilns where the bond is melted and vitrified around the grain particles, the wheels are then processed through machines that automatically finish and place lead bushings in them according to order specifications.

After grading, blottering, and packing, the wheels are ready for storage or shipment to customers.

As an indication of the production rate of the new plant, one machine now ready for installation, which does six operations in automatic sequence, will turn out 4" diameter cup wheels at the rate of one every 17 seconds. It will also improve the quality of the grinding wheels; make possible the duplication of dimensions on cup wheels for customers' repeat orders; and improve customer service.

General Robinson said that with full allowance for amortizing the cost of the new plant project, it will lower production costs. He also indicated that the new plant equipment and processes obsolete not only much of the old plant equipment, but also many of the former union contract provisions and labor relations practices. The new plant will be a tool for company growth with all the attendant benefits to customers, employees and stockholders.

That the union and the company negotiating committees understood and met the problems involved with solutions satisfactory to both parties indicates competence in labor relations comparable to the technical skill required to engineer the mechanics of the new plant, Robinson said.

The Board's authorization of a new plant in Niagara Falls for the production of 4" to 14" vitrified grinding wheels, according to Robinson, is a direct result of the new contract. Furthermore, Robinson said that as a result of the new agreement with the Union the Company would in due course add other new facilities in Niagara Falls for the manufacture of other vitrified product lines. He estimated that the total cost of the new plant for 4" to 14" grinding wheels and the new facilities for other vitrified lines that will follow in Niagara Falls will be approximately $10,000,000.

Price Reduction On Recushioning Cone-Loc Drum Sanders

The American Diamond Saw Co., 1721 N.E. 38th Ave., Portland, Ore., has now consolidated their offices. They also announce reduction in prices on recushioning Cone-Loc Drum Sanders.

If the casting is not broken or bent, the sander can be recushioned and made as serviceable as new, at a saving to the customer. If the pins are broken, they will be replaced free of charge. However, the old stubs must be removed. This can only be done by removing the present cushion. Once this cushion is removed, it cannot be reused—so must be replaced by a new one. The charge is only for the recushioning.

Over $5 Million Equipment Highlights ASTE Tool Show Sept. 29-Oct. 31

The American Society of Tool Engineers conducts its Western Tool Show and Conference, in conjunction with its Semi-Annual Meeting, Sept. 29-Oct. 31, in Los Angeles, at the famous Shrine Exposition Hall. Over $5,000,000 worth of the latest machines, machine tools, and related production equipment will be displayed.

With "Tooling for the Space Age" as the theme, a complete program of technical papers, symposia, panel discussions and plant inspection tours will be combined with the exposition. Emphasis will be placed on the Western production of aircraft, missiles and possible spacecraft of the future. Automation trends, numerical control (tape-operated machines) developments, innovations in electronic tooling, and the utilization of newly discovered materials are a few of the many industrial developments to be emphasized.

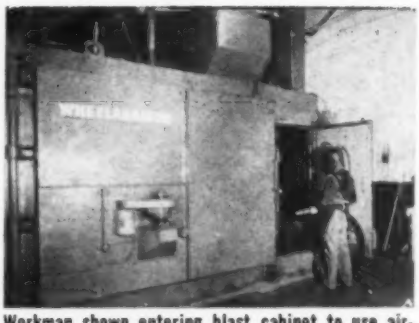
Joy Mfg. Cleans Weldments With Airless Blasting Table

Cleaning weldments, used in manufacturing such equipment as shuttle cars, loaders, and continuous miners, was a problem for the Joy Manufacturing Co., Franklin, Pa. Hand chipping and grinding had proven a time-consuming operation and often required as many as 360 man hours weekly.

After a careful study, the company selected a 96" Wheelabrator swing table. Since many of the weldments are complex in shape, a swing table with a special airblast touch-up was ordered, to enable the firm to blast areas that appeared impossible to clean 100% with the rebounding abrasive from the wheels. The machine will handle work loads up to 54" high, 96" diagonal length, and weighing up to 10,000 lbs.

Robert Snyder, the Methods Engineer at Joy, states the improvement in the cleaning operation is remarkable, with labor savings realized in excess of $400 per week.

Work on the table has been cleaned and is free from spatter and scale.

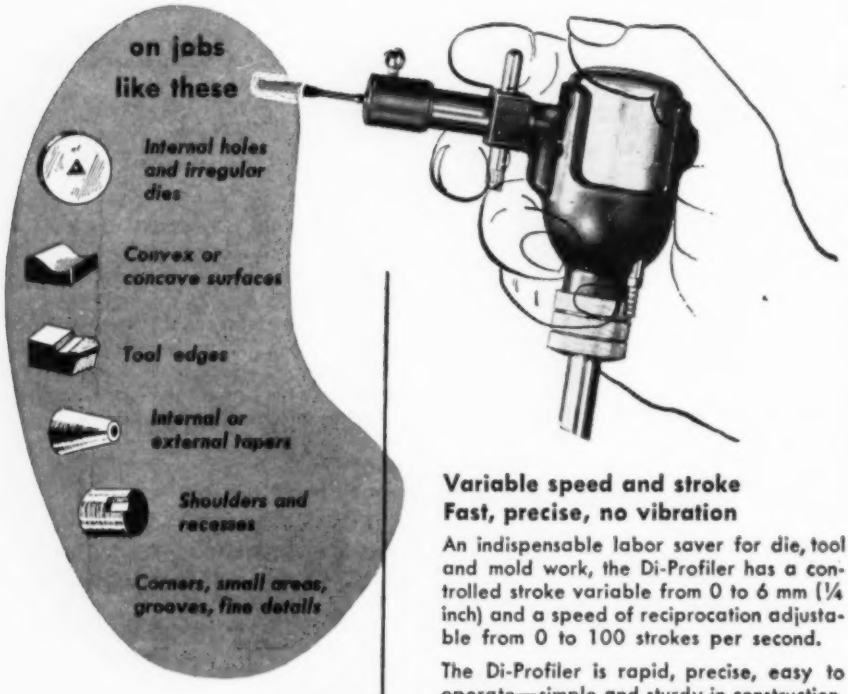


Workman shown entering blast cabinet to use airblast touch-up facilities.

Di-Profiler

RECIPROCATING HAND MACHINE

for time-saving cutting—roughing—finishing


on jobs like these
Internal holes and irregular dies
Convex or concave surfaces
Tool edges
Internal or external tapers
Shoulders and recesses
Corners, small areas, grooves, fine details

Variable speed and stroke Fast, precise, no vibration

An indispensable labor saver for die, tool and mold work, the Di-Profiler has a controlled stroke variable from 0 to 6 mm (¼ inch) and a speed of reciprocation adjustable from 0 to 100 strokes per second.

The Di-Profiler is rapid, precise, easy to operate—simple and sturdy in construction. Its weight of less than one pound and freedom from vibration eliminate fatigue and assure perfect control for the most intricate work.

Moderately priced, the Di-Profiler pays for itself many times through time-saving cost reductions.

Write for free demonstration or illustrated price list DG-98

Tools for every type of work
CUTTERS, FILES, DISCS, POINTS, BURRS, LAPS, SCRAPERS

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TOOL SHOW, LOS ANGELES

ENGIS EQUIPMENT COMPANY
Sole Authorized Distributor for the United States
431 S. Dearborn Street, Chicago 5, Illinois

New Subsidiary Formed By DeVilbiss for Metal Fabricating

Additional facilities in order to supply all the components of an integrated finishing system to industry are now offered by The DeVilbiss Co. through a new wholly owned subsidiary, DeVilbiss Metal Fabricators Co., located at 17900 Ryan Rd., Detroit. DeVilbiss can now supply an entire finishing system engineered from beginning to end by their own experienced engineers.

The new firm is the result of the consolidation of the Peters-Dalton Division of Detroit Harvester Co. and Newcomb-DeVilbiss Co. Both are engaged in the manufacture of industrial ovens, heavy-duty waterwash spray booths, parts washers, dust collectors, and a wide variety of kindred equipment.

Reber C. Stupp, formerly General Manager of Peters-Dalton, has been named Vice-President and General Manager of the new company. J. W. Cornelius is Vice-President-Engineering, and T. Kenneth McGuire, Vice-President-Sales.

Techline Is Name of New Wheelabrator Division

A new division of Wheelabrator Corp., Mishawaka, Ind., formed as the result of acquiring the former Crandall Engineering and Manufacturing Inc., of Vicksburg, Mich., will be known as the Techline Division. The new division, with headquarters at Vicksburg, will be responsible for the manufacture and sale of precision finishing equipment that includes barrel finishing machines and wet blast equipment. Complete experimental and demonstration laboratories also will be maintained in Vicksburg.

Automotive Use of Aluminum To Increase 50% in 1959

Based on a forecast of a 5.9 million car production volume, the automotive industry will require 337,000,000 lbs. of aluminum for 1959. This compares with an estimated 228,000,000 lbs. consumed by the industry in 1958, according to V. E. Flaherty, Automotive Industry Manager of Kaiser Aluminum & Chemical Sales, Inc.

A surge of auto buying is looked for next year. Cast applications, engine blocks and wheels in particular, represent tremendous potential volume. Aluminum's gains in 1959 models are attributed primarily to more liberal use of moldings, trim areas and increased use of optional equipment.

American Air Filter Plans $750,000 Plant Addition

Detailed plans for a $750,000 addition to the 25th Street plant of the Herman Nelson Division in Moline, Ill., have been revealed by American Air Filter Co., Inc. The Moline plant fabricates and assembles school classroom unit ventilators and school air conditioning equipment.

Elgin Abrasives Division Names 8 Distributors

The Abrasives Division of Elgin National Watch Co. announces the appointment of eight new stocking distributors handling the company's line of Golden Circle solid carbide tools.

The new organizations and areas handled are: Carbide Die & Mfg. Co., Azusa, Calif. (So. Calif.); Field Tool Supply Co., Los Angeles 22 (So. Calif.); Krivo Industrial Supply Co., Chicago 14 (Chicago area); Northwest Supply Co., Cincinnati (Cincinnati area and southwestern Ohio); Tennessee Die Supply Co., Inc., Nashville 6 (western Tenn., northern Ala.); Helco Mfg., St. Louis 18, Mo. (southern Ill.); Tool Crib, Inc., Knoxville 1 (eastern Tenn.); and Tool & Die Supply Co., Tampa 7 (Fla.).

Electroplating School Moves to Larger Quarters

The Joseph B. Kushner Electroplating Schools of Stroudsburg, Pa., are moving to new, larger quarters at 2509 Washington Ave., Evansville, Ind.

The school will continue to train men and women in the metal finishing industry with its "Electroplating Know How" course, by correspondence. It will also continue to sell metal finishing text-manuals.

Prenco Products Inc., Hazel Park, Mich., manufacturers of casting impregnation equipment and seals and liquid waste incinerators, has opened a new sales and service office at 2146 Irving, Dallas, Texas. Raymond Bugg, a Prenco sales engineer from Detroit, will head the Dallas office.

The Producto Machine Co., Bridgeport, Conn., has opened an expanded assembly warehouse in St. Louis, in conjunction with **Tools and Supplies, Inc.** of St. Louis, to provide fast service in die sets, diemakers' accessories and toolroom supplies.

The warehouse, located at 3131-3137 Olive St., St. Louis 3, will service eastern Missouri and southern and central Illinois. It is managed by George Willman.

Judge Tool Sales has been appointed authorized representative in the Fairfield, Conn. area for the Tool and Wheel Division of the American Coldset Corporation, Teterboro, N.J.

The **Stanley M. Proctor Co.**, 1900 Euclid Ave., Cleveland, has been selected as exclusive distributor in Northern Ohio of the **Rivett Lathe & Grinder Inc.** (Boston) air and hydraulic valves and cylinders.

Proctor is a graduate of M.I.T. and was formerly associated with General Electric Co. and the B. W. Rogers Co. He is a lecturer and instructor at Western Reserve University, Cleveland. Also well versed in pneumatic and hydraulic controls and devices is Proctor's associate, Harry W. McCracken.

Schofield Tool Supply Co. of Marcellus, N.Y., has been named sales representative in Upstate New York for products of the Taft-Peirce Manufacturing Co. of Woonsocket, R.I.

D1-S Grinder on radial drill grinding hard spot on bearing seat.

here's the way to cut costs in hole grinding

...even when needed only a few times per year!

With the Onsrud D1-S Hole Grinder you can do precision grinding in your own shop. Designed for mounting on lathe, milling machine, jig borer or drill. Air turbine motor drive gives ¼ HP, 50,000 RPM grinding speed. A precision built unit throughout with vernier scale for adjustment to 0.0001". For grinding holes up to 2¾" diameter . . . or up to 4" with adapter plate. With the D1-S you can do precision hole grinding in your own shop . . . and control quality to your own standards at considerably lower cost. Experience shows it pays for itself, even when used only a few times a year. For complete information write for Bulletin 1126.

ONSRUD MACHINE WORKS, INC.
PORTABLE TOOL DIVISION
7736 Lehigh Ave., Niles 31, Illinois

Onsrud®
D1-S
HOLE GRINDER

Six distributors for the Screwmatic 150 single-spindle automatic screw machine have been appointed by Gear Grinding Machine Co., Detroit. The new distributors and their areas are: American Tool Sales, Inc., St. Louis, Mo. (Mo. and the southern portion of Ill. south of Springfield); Boyar-Schultz Corp., Los Angeles (Calif., Ore., Wash., Nev., and Ariz.); Dorow Machine Tools, Wichita, Kans. (Kans.); Milton Granquist Co., Minneapolis (Minn., Nebr., N. Dak., S. Dak., and Ia., not including Davenport and Burlington); Production Equipment Co., Inc., Milwaukee (Wis. and the Upper Peninsula of Mich.) and Gransden-Hall & Co., Flint, Mich. (northeastern part of the Lower Peninsula of Mich.)

After twelve years of operation in Buffalo, N.Y., **Meteor Manufacturing Corp.** has moved its factory and offices to new and expanded facilities in Emporium, Pa. as of August 1. Manufacturing will be broadened to include a complete line of mechanics' hand tools and accessories for the machine tool industry.

William B. McBride continues as President of the corporation. **George Erskine** of Emporium has been elected Vice-President.

George H. Lieser, who has been department head of the Liquamatte line of wet blast equipment at Wheelabrator the last eight years, will be Field Sales Manager of the new division. **Roy Romine**, who founded Crandall Engineering in 1957, will be Chief Engineer, and **Lee Stevens** will be Director of Process Engineering.

The new division is seeking manufacturers' agents or distributors in key market areas.

Tube Methods Inc. Elects Wolf, Jr. as President

Nathan H. Wolf, Jr., has been elected President of Tube Methods Inc., Bridgeport, Pa. His father, Nathan H. Wolf, Sr., who died May 22, 1958, was President and Treasurer since the founding of the company in 1941.

The Board of Directors elected Paul V. Fly, Executive Vice-President and Treasurer; Willis W. Wolf, Vice-President; Franklin L. Wright, Secretary; Marion Boyer, Assistant Secretary, and John H. MacNamara, Assistant Treasurer. MacNamara continues as Sales Manager in addition to his new administrative duties. The other officers were re-elected to their respective positions.

G. H. Lieser

R. T. Romine

L. D. Stevens

KAY & WARREN COMPANY

Reclaimers of

Industrial Diamonds and Diamond Powders

33 Box Street **Brooklyn 22, N.Y.**

Our reclaiming department salvages diamond powders from wheels, sludges, hones, saw blades, cotton wastes or any type of diamond bearing material. We will submit quotations on an analysis basis.

Inquiries Invited!

MICRO ABRASIVES CORP. WESTFIELD, MASS.

Specialists in Fine Abrasives

ABRASIVE POWDERS for METAL, GLASS, STONE and PLASTICS POLISHING and for FRICTION POWDERS

If your NEEDS are LARGE or SMALL

We offer a TRUE CUSTOM SERVICE in the MANUFACTURE of FINE and ULTRA-FINE ABRASIVE POWDERS

Now in manufacture, fused and unfused Aluminum Oxides—and more to come.

YOUR PROBLEMS ARE OUR BUSINESS

"SERVICE" is our slogan! CALL ON US!

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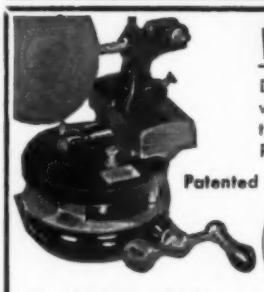
WESTFIELD, MASSACHUSETTS



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Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

Patented

Write for Price and Folder

Representatives Wanted In Some Areas

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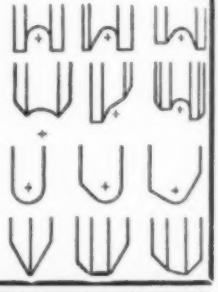

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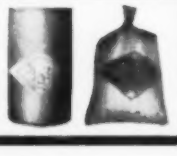
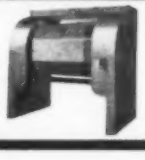


Barrel Finishing Equipment — Abrasive Media & Compounds. Write for Data Sheets and Price List. GF-9



John Marsh Named National Fluid Power Pres.

John A. Marsh is the new President of the National Fluid Power Association, having been elected at the annual meeting June 1 in Bedford Springs, Pa. Other officers, beginning their term of office July 1, are: First Vice-President, L. L. Charlson, President of the Char-Lynn Co. of Minneapolis; and Second Vice-President, Frank Flick, President of Flick-Reedy Corp., Melrose Park, Ill.

Marsh was formerly Vice-President of the association, and had served as Director since the association was founded. He is the Vice-President in Charge of Sales of the Air and Hydraulics Division of Rivett Lathe & Grinder, Inc., Boston.

William A. Baltzell, formerly Assistant Sales Manager, has been appointed Industrial Sales Manager for Oakite Products, Inc., New York City, now in its fiftieth year as manufacturers of industrial cleaning and metal treating materials. He will be responsible for the company's extensive sales staff.

Leon Salz to Assist Latin Americans in Lubrication Techniques

L. Salz

Leon Salz of Magnus Chemical Co., Inc., and an authority on metalworking lubricants, left for South America on August 8 to assist Latin American countries in developing more effective lubrication techniques. Most of his time will be spent in Rio de Janeiro and Sao Paulo, Brazil, where he will work with Magnus' Brazilian affiliate, Fabrica Productos Lavex Para Industrias Lavanderias, Ltd., visiting leading industrial plants in that area.

As Manager of the Lubricants Division, Magnus Chemical Co., Inc., Garwood, N.J., Salz has visited thousands of metalworking plants throughout the United States.

NO NEED FOR COSTLY DIAMOND WHEEL DRESSING

Diamond Grinding Wheels Contoured to Your Specs. . . . With our Electro Formed Nickel Matrix. The Ultimate in Shape Retention at a Fraction of Your Current Wheel Costs.

Diamond Quills Available from .014" diameter Cut-off Wheels down to .004" in thickness.

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Manufacturers Of Quality Diamond Tools
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● ACTUAL MANUFACTURERS OF RESINOID METAL AND VITRIFIED DIAMOND WHEELS UP TO AND INCLUDING 20" DIAMETERS

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● MANUFACTURERS OF RESINOID AND RUBBER BONDED WHEELS SERVING THE AIRCRAFT, CUTLERY AND STEEL FABRICATING INDUSTRIES.

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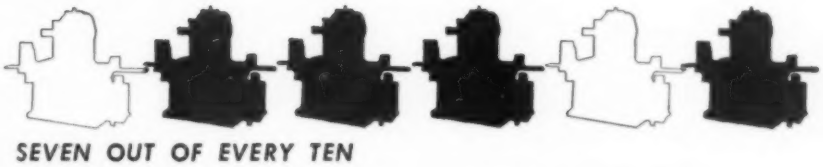
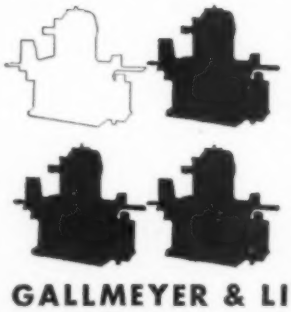
271 GROVE AVE.
VERONA, N.J.



SEVEN OUT OF EVERY TEN

GRAND RAPIDS GRINDERS...



— are purchased by firms already owning one or more of them. Three out of every 10 sold go to new customers. Once you've enjoyed the advantages of a Grand Rapids Grinder in your plant, chances are, like so many present users, you'll surely want more of them.

Write for 24-page book that tells you why.

GALLMEYER & LIVINGSTON CO.
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Oriented

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are

"Pressure-Set"

to

LAST LONGER...
CUT CLEANER

Regardless of your wheel dressing problem . . . you'll find PRESTALLOY tools cut cleaner and last longer . . . thanks to exclusive "Pressure-Set" processing! This advanced method of anchoring, permanently locks the diamonds in place at the correct operating angle . . . to insure maximum dressing speed and efficiency. Couple these field-proven advantages with the completeness of the PRESTALLOY line, and you'll know why there's a PRESTALLOY tool to meet your specific needs. Below are shown but a few of the many standard PRESTALLOY dressers immediately available.

SINGLE STONE DRESSERS
for straight form and radius work.

IMPREGNATED DRESSERS
for production grinding operations.

MULTI-DIAMOND
for straight face and side dressing.

PROFILE DRESSERS
for straight, form and profile use.

New illustrated PRESTALLOY catalog yours for the asking. Write today!

Fast delivery on non-standard dressing tools to your exact specifications. Send us your prints for quotation.

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Dealerships available in some areas

Reserve Capacity!

It is the reserve capacity for hard usage that makes Clover Coated Abrasives worth special consideration. In spite of every precaution, abrasive belts and discs are often subjected to extra strains and stresses in the course of a job.

That is the reason Clover tries to make every belt, band, disc, and roll just a little better than anyone could expect. Ask your Clover Distributor or write us direct, for a Clover Catalog. It lists many items worth special consideration.

Clover Manufacturing Company

Norwalk, Connecticut

Victor 7-4515

Makers of the famous
CLOVER Grinding and Lapping **COMPOUNDS**

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

MIGHTY GOOD AT ANY PRICE BUT TOPS AT ONLY $149.50
(Both tools including diamonds)

The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.

Our fixtures will dress most radii and angles tangent to each other, similar to those shown below.

FREE handsome, wooden storage box. Write for complete information.

PURCHASE EITHER TOOL SEPARATELY

Now you can purchase either the G-5 Radius Dresser or the G-2 Angle Dresser and Tool Holder separately if you so desire. (Without storage boxes)

G-5 Radius Dresser complete with diamond $80.00.

G-2 Angle Dresser and Tool Holder complete with diamond $87.50.

Replacement diamonds are always available for our units at a reduced price. Diamonds for the G-2 $5.00 each; diamonds for the G-5 $8.00 each.

Distributorship available in select territories

ROTHFUSS TOOL COMPANY

BOX 2696, ELMWOOD STATION — PROVIDENCE 7, R. I.

Members of the Norton Distributor Advisory Council held the eighth annual conference recently at Norton Co.'s main office in Worcester, Mass. Seated, from left: Sam Orr, Orr Iron Co.; Paul Evans, Beals McCarthy and Rogers, Inc.; Paul Stine, Harry P. Leu, Inc.; Warren Hardy, Mgr. of Bus. Res., Robert Cushman, Mgr. of Mktg. Serv., Sidney Wetherhead, Mgr. of Dist. Sls. Prom., Donald Price, Sls. Mgr. of Grinding Wheels, and Alex McCune, Mgr. of Field Sls.—all of Norton Co.; Wallace Campbell, Campbell Industrial Supply Co.; Preston Baxter, Mahoning Valley Supply Co.; Victor Brink, Binghamton Industrial Supply Co.; Sam Clark, Samuel Harris and Co., and G. Cheston Carey, Carey Machinery and Supply Co. Standing, from left: George Park, Sls. Mgr. for Abrasives, Norton Co.; Joe Eigo, A. N. Nelson, Inc.; Ray Dunberg, Mid-States Industrial Corp.; Henry Idema, Manufacturers Supply Co., and Stu Russell, J. Russell and Co.

The Council meets each year to discuss and make recommendations on a variety of matters pertaining to the manufacturer-distributor relationship.

Three changes in the field sales force of the American Air Filter Co., Louisville, Ky., have been announced. **Joe P. Richardson,** formerly with the Air Filter Products Dept., in the firm's home office, has been transferred to the AAF's Minneapolis branch office. **Stanley D. Jensen,** Sales Engineer, has been added to the firm's Denver branch office. **Kenneth Hutchinson** has joined Albert L. Becker, Albany, N.Y., as a Sales Engineer.

Dr. W. Welkowitz

R. E. Sansonetti

Dr. Walter Welkowitz has been named Director of Engineering for the Vibro-Ceramics Division, Gulton Industries, Inc., Metuchen, N.J. His current duties will include the direction of all engineering and research activities in the fields of industrial ultrasonics and medical-electronic instrumentation.

Prior to joining the firm in 1955, Dr. Welkowitz lectured on acoustics in the Graduate School of Engineering, Columbia University. He further studied the biological applications of ultrasonics as a graduate student and research associate at the University of Illinois.

Robert E. Sansonetti, sales representative for Latrobe Steel Co., Latrobe, Pa., has been transferred to the Hartford branch office, at 112 Prospect Ave., in order to cover the southern Connecticut territory. He was formerly with the Pittsburgh branch office.

Gilmore Diamond Tools

These Needle-Point Diamonds are used on wheels for grinding taps, thread gauges, etc.

Write for

Illustrated 32 page catalog.

from $1.50 up

F. F. GILMORE & COMPANY 725 BOYLSTON ST. BOSTON 16, MASS.

SAFETY FIRST

Built into Your Wheels!

Conforms to ASA Safety Code requirements for cupwheel guards

CARROLL'S SAFETY-GUARD INSERTS

Give you BUILT-IN Operator Safety and Top Performance.

This radically new Safety Guard Insert with its integrated revolving guard gives you the all-important safety factor with increased wheel strength and efficiency.

Added economies in production are gained from the ready-made molding form provided by the Guard. True dynamic balance, back flatness and concentricity, show consistently close tolerances within .010 T.I.R.

Safe grinding wheels mean increased production — use and specify wheels with the new Carroll Safety Guard.

• A Positive Guard on Every Cup Wheel • Highest Safety Factor • One Piece Assembly • Increased Strength • Light Weight • Fool Proof Mounting • No Adjustment Necessary • True Dynamic Balance

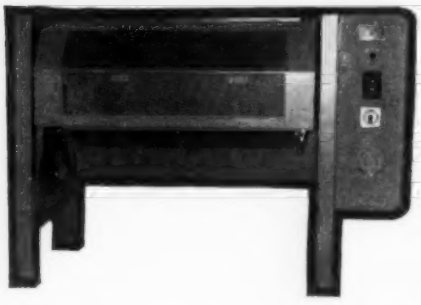
Write for Information on Carroll's Safety Guard Insert

CARROLL PRESSED METAL, INC.
133 DEWEY ST.
WORCESTER 10, MASS.

Versatile BARREL FINISHER CUTS COSTS with multiple loads

Model V8 combines all these features:

1. One, two or four compartments, 8 cu. ft. vinyl-lined barrel.
2. Push-button control with front-panel 12-36 rpm speed changer.
3. Choice of compartments for simultaneous finishing of different types of parts.



4-barrels-in-1 is only part of the story about versatile Model V8! All barrels are readily interchangeable, allowing one, two or four compartments to be used as needed . . . for either continuous production finishing or special processing of widely different parts.

Model V8 uses a 1½ hp magnetic brake motor, has vinyl NO-Seam barrel linings, handles heaviest loads including steel-ball burnishing. A proved cost-saver for production shops, custom finishing, or in-plant departments.

FULL DETAILS are contained in "V8 Data Sheet." Send for your copy today.

BARREL FINISHERS • SCREEN SEPARATORS • COMPOUNDS • NYASLUGS

RAMPE MFG. CO.
14915 WOODWORTH AVE., CLEVELAND 10, OHIO

New, Lightweight, Powerful

FLEXIBLE TOOL SHAFT

Connects To Any Motor

Stow flexible tool shafts increase precision, eliminate operator fatigue on production grinding, polishing, sanding and other finishing operations in which the operator must hold the tool for long periods of time. Up to 3 HP can be transmitted through these new tool shafts, which consist of a core made of highest grade music wire rotating inside a rubber-covered casing. Each shaft furnished with ball bearing motor connection and high-speed ball bearing handpiece with removable wheel Arbor having ½-20" threads. An angle head can be used in place of the handpiece as shown in the photograph.

Four Sizes of these shafts are available . . . models 38, 40, 50 and 63, which come in 6-foot standard lengths. The largest shaft, model 63, will handle 3 HP at speeds up to 6900 RPM and has a maximum capacity for various accessories as follows: grinding wheel, 8" x 1"; buffing wheel, 8" x 1"; sanding disc, 9" diameter; sanding drum, 6" x 2½"; wire brush, 8" x 2"; steel drills, ½" diameter.

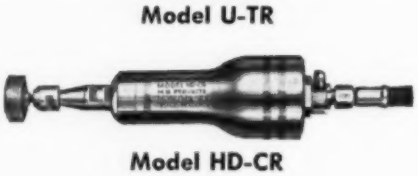
Write for Catalog 57

STOW MANUFACTURING CO.
310 Shear St. Binghamton, New York

M-B PNEUMATIC GRINDERS

Model M-CR-B

Model U-TR



Model HD-CR

Outstanding, powerful, fast-cutting tools of proven high efficiency. Designed for tough jobs and real production. Perform indefinitely and dependably. Precision made. Steel housing for safety. Also other models.

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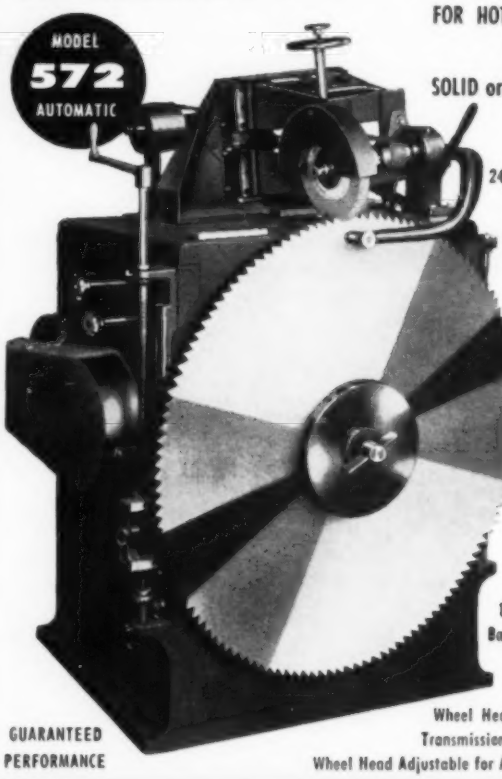
46 VICTOR AVE., Div. 21
DETROIT 3, MICHIGAN

HANCHETT METAL SAW SHARPENER

FOR HOT and COLD SAWS
TYPES
SOLID or INSERTED TOOTH

MODEL 572 AUTOMATIC



CAPACITY
24" to 72" and Larger

HEAVY DUTY
POWERFULL
SMOOTH
ACCURATE

DEALER INQUIRIES INVITED

BEARINGS
100% Anti-Friction
Ball and Roller Types

MOTORS
Wheel Head — 2 H.P. — 1800
Transmission — ½ H.P. — 1200
Wheel Head Adjustable for Any Saw Tooth Angle

GUARANTEED PERFORMANCE

HANCHETT MANUFACTURING COMPANY
Main Plant BIG RAPIDS, MICH.
West Coast PORTLAND 1, ORE.

REPRINTS AVAILABLE

Grinding Outer Surface of Cone Shaped Part

Grinds and Laps in One Operation

Helped Hupp Aviation Solve Visual Finish and Deburring Problems

How and Why of Abrasive Wheels
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by John C. Wilson

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by James R. Gilman

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by Arthur L. Wilson ..... .25

Developing Standard Time Data for Grinding Operations
by E. A. Cyrol $1.00

Grinding and Finishing

222 E. Willow — Wheaton, Ill.

FISKE'S MAGIC COMPOUND

This Water Soluble Cutting Compound Stays Mixed

FISKE'S "MAGIC" COMPOUND, when dissolved in water, goes into a permanent emulsion—will never separate. It cools, lubricates and produces a high finish. Lengthens tool life. Does not become rancid. Try FISKE "MAGIC" COMPOUND and see the improvement in your work.

Bulletins describing FISKE'S MAGIC COMPOUND and other specialty lubricants and coolants sent on request.

FISKE'S *Since 1870* METAL WORKING LUBRICANTS

FISKE BROTHERS REFINING CO.
129E Lockwood St., Newark 5, N. J.
Plants: Newark 5, N. J. and Toledo 5, Ohio

cut barrel finishing costs on small batches

Here is a new type of barrel for de-burring, de-scaling and burnishing small parts in small batches. The barrels are made of rubber-resin in chemical combination, a material with the excellent properties of toughness with lightness and resistance to wear and corrosion.

The barrel sizes available are 2½, 1¼ and ¾ nominal U.S. gallons. Open end of barrels sealed with a leak-proof, quick-release closure. Fitted with two solid rubber-resin tyres for rolling on open rolls.

The barrel finisher shown consists of three sets of rolls arranged in three tiers, each set consisting of a driven roll and an idler roll. Each tier driven by a separate motor or, if required all three can be driven by one motor. The idler roll is adjustable to take the different barrel diameters and various combinations of barrel sizes can be rolled at the same time such as six 2½-gallon or two 2½-gallon and four 1¼-gallon or six 1¼-gallon or nine ½-gallon.

Write for details and descriptive leaflet today

PASCALL THE PASCALL ENGINEERING COMPANY LIMITED GATWICK ROAD CRAWLEY • ENGLAND

NOW...Better by actual test...

this NEW **A.I.T.** "E-2" Diamond Wheel for...

ELECTROLYTIC GRINDING

The exclusive "E-2" bond in A.I.T. diamond wheels has been developed specifically to guarantee that you get the FULL VALUE out of Electrolytic grinding of carbides. We can prove this in YOUR plant, on YOUR grinders, with these results:

1. **Wheel pre-run to eliminate break-in time in YOUR plant.**
2. **Faster stock removal.**
3. **High peak removal for longer intervals**
4. **Longer wheel life.**
5. **Less corrosive action**
6. **Specially designed wheel to reduce weight and distribute electrolyte efficiently**

Remember, to get these FULL VALUE results, be sure to send for complete test data today.

A.I.T. Diamond Tool Co. — 8215 N. KIMBALL AVE. SKOKIE, ILLINOIS

NEWS OF INDUSTRY *continued*

Paul A. Stewart

L.C. McAnly Sr.

Paul A. Stewart, who has been General Manager of Production Planning for the Maytag Co., Newton, Iowa, will succeed **L. C. McAnly, Sr.,** Manager of Manufacturing, who retired August 29. Duties now performed by Stewart will be absorbed by existing personnel, and the title of General Manager of Production Planning will be abolished.

McAnly has headed factory management at Maytag plants since 1943. Stewart joined the firm in his present position in November, 1952.

Obituary

Garrett Roberts, President of Weldon Roberts Rubber Co., Newark, N.J. died on Wednesday, July 23. He was 59 years of age and had spent all his adult life in the business founded by his father.

George H. Gustat, Director of the Industrial Engineering Division at the Kodak Park Works plant of Eastman Kodak Co., has been elected President of the American Institute of Industrial Engineers. His formal acceptance of the post for the 1958-59 term took place June 14 at the Institute's ninth annual convention in the Hotel Statler, Los Angeles, Calif. The engineering group, with more than 150 chapters in the United States, has a membership of more than 8,000 persons.

Gustat joined Kodak in 1930, serving in various capacities. Since 1949 he has headed the Industrial Engineering Division, which includes responsibility for wage standards, work measurement, and engineering methods.

James H. Cogshall has been appointed Sales Manager and **Robert S. Mercer** Manager of Development of the Pennsalt Chemicals Corporation, Corrosion Engineering Products Dept., both headquartering at Natrona, Pa.

Cogshall, a well-known corrosion engineer, joined the firm as a staff coatings engineer at the Wyandotte, Mich. works in 1950. Mercer, formerly at Pennsalt's Central Research and Development Laboratories, is a veteran of more than 20 years' corrosion engineering experience. He joined the organization in 1951.

Manufacturers' Representatives

To sell new line of precision finishing barrel and wet blast machines, media compounds, abrasives, offered by 50-year leader in metal cleaning and finishing. Backed by national advertising, many sales aids. Steady income through repeat sales of supplies. Several excellent territories open. Send information including experience in metal finishing, territory covered, customers, lines carried, references.

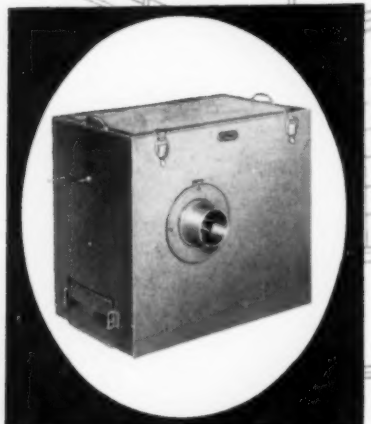
TECHLINE div.
of WHEELABRATOR CORP.
2400 Ave. V Vicksburg, Michigan

New organization wants experienced abrasive sales engineers in all states. Excellent opportunity and lucrative future for those who have know-how and contacts. Applications confidential.

Write: Box 23, GRINDING & FINISHING
222 E. Willow Ave., Wheaton, Ill.

DEMONSTRABLY, the WORLD'S FINEST
DIAMOND WHEEL LINE
AVAILABLE IN
RESTRICTED TERRITORIES
We are seeking expanded distribution control in all key U.S. Industrial areas.
Box 22
Grinding & Finishing, Wheaton, Ill.

DUSTKOP "520"
designed to collect dust from single machines

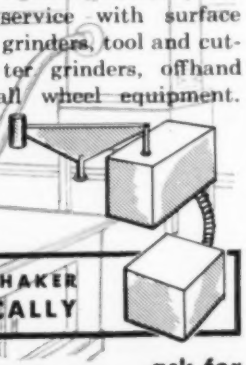


portable— easily installed

DUSTKOP STOPS DUST

Self-contained Dustkop models, like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

Write for illustrated literature . . .
46 models to choose from!



NEW DUSTKOP AUTO SHAKER
shakes filters AUTOMATICALLY

AGET manufacturing company
1380 E. Church Street, Adrian, Michigan
ask for details

ACCURACY .0002 T.I.R.

.0002 T.I.R. or less at Spindle Nose, .0005 T.I.R. or less on Test Arbor six inches from Spindle Nose

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.

Clip ad to your letterhead and send for Literature

K. O. Lee Company, Aberdeen, S. D.

Index to Advertisers in September Issue

TO OBTAIN INFORMATION FROM ANY OF THESE ADVERTISERS, FIND THE BOLDFACE KEY NUMBER *PRECEDING* THE ADVERTISER'S NAME . . . AND CIRCLE THAT NUMBER ON ACTION CARD AT RIGHT

Circle No.		Page No.
201	Abrado Finish Corporation	92
202	Abrasive Machine Tool Company	60
203	Aget Manufacturing Company	98
204	A.I.T. Diamond Tool Company	97
205	Allison-Campbell Division, American Chain & Cable Company	58
206	Almco Division, Queen Stove Works	17
207	American Chain & Cable Company, Allison-Campbell Division	58
208	Atlantic Abrasive Corporation	71
209	Bay State Abrasive Products Company	36, 37
210	Blanchard Machine Company, Grinding Wheels Division	11
211	Boyar Schultz Corporation	84
212	Brightboy Industrial Division, Weldon Roberts Rubber Company	79
213	Brunmar Commercial Corporation	70
214	Carborundum Company, Electro Minerals Division	20, 21
215	Carroll Pressed Metals, Inc.	95
216	Chicago Wheel & Manufacturing Co.	69
217	Cincinnati Milling Machine Company, Grinding Machines Division	2, 3
218	Cincinnati Milling Machine Company, Cimcool Division	56
219	Cleveland Grinding Machine Company	83
220	Clover Manufacturing Company	94
221	Commercial Filters Corporation, The Delpark Division	4
222	Cosa Corporation	78
223	Crane Packing Company	40
224	Diamond Products, Inc.	94
225	Engelberg, Incorporated	66
226	Engis Equipment Company	90
286	Erickson Tool Co.	4th Cover
227	Fiske Brothers Refining Company	97
228	Gallmeyer & Livingston	93
229	Gilmore, F. F. & Company	95
230	Hammond Machinery Builders, Inc.	77
231	Hanchett Manufacturing Company	96
232	Harig Manufacturing Company	13
233	Hill Acme Company, The	22
234	Hitchcock Publishing Company	88
235	Hoffman Brothers Drilling Company	63
236	Industrial Distributors, Ltd.	39
238	J & S Tool Company, Inc.	74
237	Jeon Manufacturing Company	92
239	Kay & Warren Company	92
240	Kirk & Blum Manufacturing Company	54
241	Kramer, H.W., Company, Inc.	72
242	Kuzmick Company, Paul L.	93
243	Lee, K. O. Company	98
244	Macklin Company	3rd Cover
245	Manhattan Rubber Division, Raybestos Manhattan Corporation	19
246	Mattison Machine Works	52
247	M-B Products Company	96
248	Micro-Abrasives Corporation	92
249	Modern Devices (Subsidiary Twentieth Century Company)	85
250	Moore Special Tool Company, Inc.	73
251	Norton Company, Grains Division	48
252	Norton Company, Machine Division	8, 9
253	Norton Company, Wheels Division	33
254	Onsrud Machine Works, Inc., Portable Tool Div.	91
255	Parker-Majestic, Inc.	55
256	Pascall Engineering Company	97
257	Pekay Abrasives Company	93
258	Pratt & Whitney Company	67
259	Queen Stove Works, Almco Division	17
260	Radio Corporation of America	6, 7
261	Rampe Manufacturing Company	96
262	Raybestos Manhattan, Inc., Manhattan Rubber Division	19
263	Rivett Lathe & Grinder, Inc.	49
264	Rocheleau Tool & Die Company	82
265	Rothfuss Tool Company	94
266	Roto-Finish Company	18
267	Sample Marshall Laboratories, Inc.	93
268	Sanford Manufacturing Corporation	87
269	Simonds Abrasive Company	14, 15
270	Smit, J. K. & Sons, Inc.	65
271	Stow Manufacturing Company	96
272	Sundstrand Machine Tool Company	75
273	Sunnen Products Company	50
274	Superior Hone Corporation	80
275	Texas Company, The	2nd Cover
276	Thompson Grinder Company	5
277	Timesaver Sanders	81
278	Torit Manufacturing Company	64
279	Ty-Sa-Man Machine Company	86
280	U.S. Hoffman Machinery Corporation	34
281	Vulcan Tool Company	51
282	Walker, O. S. Company	10
283	Weldon Roberts Rubber Company, Brightboy Industrial Division	79
284	White & Bagley Company, The	62
285	Whitnon Manufacturing Company	76

Handy Information Cards

THE two postpaid post cards at the right are to help you obtain information about products advertised in this issue. These cards provide key numbers for you to circle to get information about any new product item, free literature item or advertisement published in this issue. New product and literature items are numbered where they appear. For information about any advertisement, simply find the manufacturer's name in the Advertising Index above, note the boldface number preceding the name and circle that number on the Action card. Before sending the card, please check to see that you have included your name and address.

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ADVERTISEMENTS:

154 155 156 157 158 159 160 161 162 163 164 165 166 167
213 214 215 216 217 218 219 220 221 222 223 224 225 226 227
228 229 230 231 232 233 234 235 236 237 238 239 240 241 242
243 244 245 246 247 248 249 250 251 252 253 254 255 256 257
258 259 260 261 262 263 264 265 266 267 268 269 270 271 272
273 274 275 276 277 278 279 280 281 282 283 284 285 286 287
288 289 290 291 292 293 294 295 296 297 298 299 300 301 302
303 304 305 306 307 308 309 310 311 312 313 A1 A2 A3 A4

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LITERATURE:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
NEW PRODUCTS:					101	102	103	104	105	106	107	108	109	110	111		
	112	113	114	115	116	117	118	119	120	121	122	123	124	125			
	126	127	128	129	130	131	132	133	134	135	136	137	138	139			
	140	141	142	143	144	145	146	147	148	149	150	151	152	153			
	154	155	156	157	158	159	160	161	162	163	164	165	166	167			
ADVERTISEMENTS:			201	202	203	204	205	206	207	208	209	210	211	212			
213	214	215	216	217	218	219	220	221	222	223	224	225	226	227			
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242			
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257			
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272			
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287			
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302			
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4			

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LITERATURE:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
NEW PRODUCTS:					101	102	103	104	105	106	107	108	109	110	111		
	112	113	114	115	116	117	118	119	120	121	122	123	124	125			
	126	127	128	129	130	131	132	133	134	135	136	137	138	139			
	140	141	142	143	144	145	146	147	148	149	150	151	152	153			
	154	155	156	157	158	159	160	161	162	163	164	165	166	167			
ADVERTISEMENTS:			201	202	203	204	205	206	207	208	209	210	211	212			
213	214	215	216	217	218	219	220	221	222	223	224	225	226	227			
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242			
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257			
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272			
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287			
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302			
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4			

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213	214	215	216	217	218	219	220	221	222	223	224	225	226	227
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4

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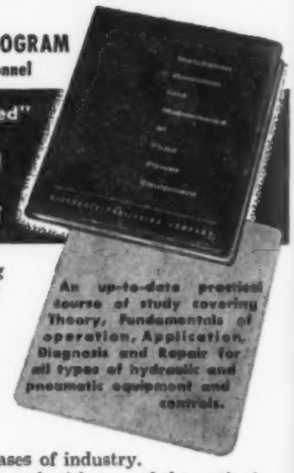
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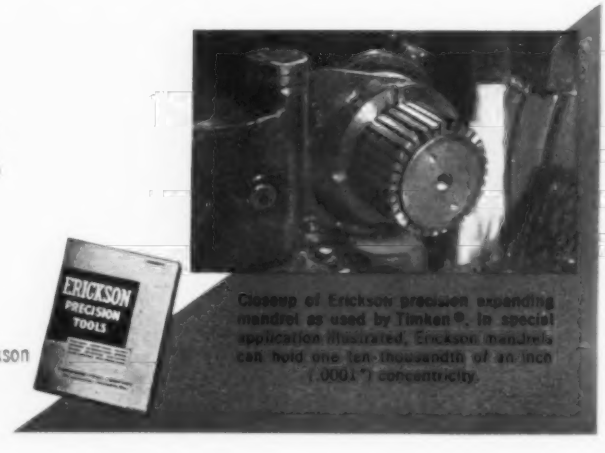

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